ADVERTISING PAGES NEXT

MEASURING

FIVE BILLIONTHS OF A GRAM

Speaking of "important trifles," there is no better example than those impurities in caustic soda which make so much trouble in rayon manufacture. For of all processing and manufacturing operations, rayon manufacture is probably the one in which alkali impurities get—and deserve—the most attention.

It is a significant fact, therefore, that Mathieson Caustic Soda sets the standard for purity in the rayon industry. It is equally significant that Mathieson should be the first to develop a practical method for quantitative spectrographic analysis of caustic soda.

By using spectrographic equipment, Mathieson has reduced the time required for quantitative analysis to a fraction of that previously required. Even more important, the accuracy of the results obtained has been increased to a point where impurities present in amounts as low as 1/100,000th of 1% (actually about 5 billionths of a gram) can be closely determined.

With this greater speed and increased accuracy, Mathieson is able to control the purity and uniformity of its caustic soda more closely than ever before. In addition, the company's technical and spectrographic staffs are in position to render valuable service to users of caustic in establishing their own spectrochemical laboratories and procedures.

Chemical buyers interested in knowing more of the part Mathieson has played in the development of the alkali industry will want to own a copy of "Mathieson Chemicals," a 36-page booklet outlining the company's history and describing its various products. Write for your copy today to The Mathieson Alkali Works (Inc.), 60 East 42nd Street, New York, N. Y.

Mathieson Chemicals

SODA ASH . . . CAUSTIC SODA . . . BICARBONATE OF SODA . . . LIQUID CHLORINE . . . BLEACHING POWDER . . . HTH AND HTH-15 . . . AMMONIA, ANHYDROUS AND AQUA . . . PH-PLUS (FUSED ALKALI) SULPHUR CHLORIDE . . . CCH (INDUSTRIAL HYPOCHLORITE) . . . DRY ICE (CARBON DIOXIDE ICE) ANALYTICAL SODIUM CHLORITE

The Reader Writes:—

The Odds are 6 to 1

Up to about 1932 the weekly issues of the Official Gazette of the United States Patent Office averaged about six and one-half per cent. of patents without drawings—these obviously being chemical patents. In the latter part of 1937 the number of patents issuing without drawings had risen to about 10½ per cent. Another observer has recently estimated that 16 per cent. of all patents are chemical patents, basing the estimate on the total patents issuing weekly from the so-called "chemical divisions" of the Patent Office.

Counts of printed decisions in various volumes of U. S. Patents Quarterly show that the printed decisions on chemical inventions frequently outnumber the decisions on mechanical inventions. It may be noted that electrical and radio inventions seem to cause less than their due proportion of legal trouble.

In other words, chemical inventions are likely to produce six to 10 times the legal difficulties that mechanical inventions produce. Chemical inventions require much more careful watching over as they progress along into patents than has hitherto been supposed.

N. Y. City — Edward Thomas

Why Chemists Stay Broke

The reason chemists stay "broke" is that they are suckers enough to be continually over-sold on literature.

Kingsport, Tenn. — W. B. Hinche, Tennessee Eastman Corp.

Why Chemists Do Not Get Hired

I have just read "Why Chemists Get Fired" with great interest. The first two instalments show the viewpoint of the chemical employers, while the third article (in November issue) presents the viewpoint of the educators. But I have not seen anything that would give the viewpoint of the chemists in their status as employees. This ought to be an interesting article.

I would like to say that I am not crying over the hard experiences which I have had for the past five years in trying to locate a position along the line of my formal education. But it seems to me that it is not quite fair on the part of the corporations to take *newly graduated chemists* in preference to the chemists who have graduated a few years before *and* failed so far to locate positions in the chemical industries. These chemists have invested so much of their money and time in their education in chemistry or chemical engineering, and it seems only fair that they should be given a fair and full chance to prove themselves *before* the next batch of new chemists is sampled.

When I entered M. I. T. in 1929, everything looked rosy, but when I graduated in 1932 the roses had long since died. Through the next five years I have been moving earth and heaven for a job in some chemical concern or laboratory with little success—except for a few months' experience in a chemical plant. But although I have tried about a million concerns, the same concerns have taken on chemists just graduated each year or nearly so since 1933 or 1934.

It is true that I am deaf—which counts against me in a way, *but* in chemical research deafness is not very much of a handicap—it helps me concentrate more on the problem, and to escape distractions of other things. Practically every one thinks that the deaf chemist should not enter industrial chemistry or research. I do not agree with this opinion. I feel sure that when I finally obtain a chance, I will prove myself to be a good chemist. My attitude is buoyed by the fact that I graduated from Union College (N. Y.) with an A.B. degree and M. I. T. with Master of Science in Chemistry degree.

But in spite of my inability to obtain a job or even a promise of one, I do not feel at all discouraged. I am feeling quite optimistic about my future chances.

Washington, D. C. — Edward Croft, Jr.

Added Attractions

It was next to impossible to get within reaching distance of the very effectively displayed bottles of "The New Chemicals of Commerce" at your booth at the Chemical Exposition. You have originated an attraction for every visitor and many of us are forming the habit of definitely spending considerable time at your particular exhibit. I may be prejudiced, of course, being chemically minded; but to me it was the high spot of the show.

I wonder what you will think of this idea of an additional attraction?

As you know, it is difficult to get close enough to the bottles to read labels with so many people in the booth. How about arranging for a photographic projector, in which a magnified view of the reading matter might be displayed on a screen. I think of one valid objection to providing any extra attractive features for your booth, because if it acquires a much greater popularity, you will have to occupy the center of the hall altogether.

Rochester, N. Y. — Samuel J. Cohen, President, Amecco Chemicals

Speaking of Traffic Jams

Congratulations to you, both on the excellency of your booth at the Chemical Exposition, and the terrible traffic jam around it. The latter testifies to the interest created by the former.

New York, N. Y. — E. Rosendahl, Glyco Products Co.

It Traps a Lot of New Readers

Many congratulations on the new mouse trap. I am sure the blue section will attract everybody's attention. To me, the form in which it is gotten up will be immensely valuable. I hope you never bind it in with the main magazine, nor fail to include the list of patents.

New York City — R. B. Lebo, Standard Oil Development Co.

Test Tubes and Stock Prices

I like your publication. I often find items of interest—grist for my class-room—which I do not see elsewhere. I like to note the relation between the test-tube and the bulletins of the stock market. The class likes it, too.

Amherst, Mass. — Prof. Howard W. Doughty

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SOLVENT NEWS

Reg. U. S. Pat. Off.

February ★ A Monthly Series of Articles for Chemists and Executives of the Solvent-Consuming Industries ★ 1938

Report Ethyl Cellulose Will Raise Viscosity Of Spirit Varnishes

BROOKLYN, N. Y.—Addition of ethyl cellulose is one of the most effective means of raising the viscosities of Pontianak spirit varnishes, according to recent experiments at the laboratories of the American Gum Importers Association, Inc.

Ethyl cellulose, it was found, not only produced greater viscosity per pound added than did other materials such as nitrocellulose or non-solvents for Pontianak, but had the additional advantage of solubility in alcohol or Solox,* one of the most widely used solvents in the spirit varnish field.

The tests were made with 5 pounds of Pontianak Nubs per gallon of Solox.* This varnish had a viscosity of E (on the Gardner-Holdt scale). By varying the amounts of ethyl cellulose added from zero to 0.4 pound per gallon of Solox* it was possible to produce a viscosity as high as Z4 (65 poises).

*Proprietary Solvent of the U. S. Industrial Alcohol Co. Leaflet on request.

Claim New Adhesive Can Rebond Smooth Surfaces

WASHINGTON, D. C.—An adhesive which may be peeled from any smooth surface and then be re-affixed by pressure alone is revealed in a patent just granted here.

According to the patentee, a composition which has this property is obtained by combining cellulose nitrate with 65.3-71.5 volume per cent of castor oil and dissolving this in a suitable solvent which may be as follows: butyl acetate, 25 parts; butyl alcohol, 10 parts; ethyl alcohol, 5 parts; ethyl acetate, 10 parts; toluene, 50 parts.

"Sunburn" Lacquered Skins To Make Better Patent Leather

BERLIN, Germany — First class "patent" leather can be produced by subjecting the lacquered skins to ultra-violet radiation for about two hours in a comparatively dry and ozone-free atmosphere, according to a report published here. The method given is to pass the skins, arranged on a suitable conveyor, at a rate of about 40 feet per hour under quartz lamps.

Use Ethyl Alcohol to Dehydrate Leather In New Tanning Process

Ethyl alcohol is effective for dehydrating leather in a new tanning process reported in a recent issue of the Journal of Applied Chemistry. The pickled leather is dehydrated in a stream of alcohol, ether or acetone vapors at 50 deg. C., according to the article. Simultaneous dehydration and tanning are achieved, the author states, by passing formaldehyde vapors over the leather at 40 deg. C. for 4 hrs.

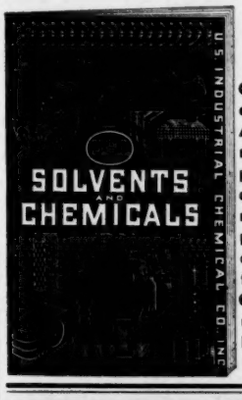
To Hold Banquet on March 3rd

Over 1,800 chemists and executives of nearly every large chemical and drug organization are expected to attend the 1938 Drug, Chemical and Allied Trades Banquet at the Hotel Waldorf-Astoria, New York City, on Thursday, March 3rd.

See "Perfect" Lacquer In Inventor's 700th Patent

MONTCLAIR, N. J. — Carleton Ellis, whose inventions range from dog biscuits to a substance for fireproofing airplanes against incendiary bullets, has received his 700th patent from the Patent Office, it was announced here recently. It is for a lacquer described as a step toward the "perfect paint."

Ellis obtains his lacquer by incorporating in a solvent like ethyl alcohol or acetone, syrupy or hard condensation products such as urea formaldehyde or derivatives of urea such as thiourea, the patent papers reveal. Special emphasis is placed on its applications as an impregnating material for tissue and glassine papers and for reducing the inflammability of nitrocellulose coatings or plastics.



NEW U.S.I. CATALOG

Copies of U.S.I.'s new catalog of SOLVENTS AND CHEMICALS are now available. Complete specifications and applications of more than forty important products are covered. All requests for SOLVENTS AND CHEMICALS should be made on your letterhead.

Ethyl Formate Now Made by U.S.I.; Aids Organic Synthesis

New U.S.I. Product Also Used As a Fumigant and Larvacide

With the addition of Ethyl Formate to products of its manufacture, the U. S. Industrial Chemical Co., Inc., has further expanded its line of chemicals derived from alcohol. Ethyl Formate is made by the esterification of formic acid with ethyl alcohol.

Although a number of uses have heretofore been made of Ethyl Formate, it became better known more recently as one of the basic organic substances employed in the commercial synthesis of crystalline vitamin B_1.

Another recognized application for Ethyl Formate is as a fumigant and larvacide for certain foodstuffs prior to packaging. Having the desirable characteristics of complete and rapid evaporation, as well as absence of residual taste and odor, it has been utilized for controlling the infestation of tobacco, dried fruits and other similar products.

In Vitamin B_1 Synthesis

The characteristic aroma of peach kernels has made Ethyl Formate of interest in compounding perfumes and flavoring bases.

Various sources name Ethyl Formate as an inhalant for treatment of certain respiratory inflammations. Other examples of its roles in

(*Continued on next page*)

FEMALE RAT, 24 WEEKS OLD
This rat above did not have enough vitamin B. The lack of muscle control is called spastic paralysis. The same rat below, 24 hours later, after having received a food rich in vitamin B. Already it has recovered muscle control.
MALE RAT, 28 WEEKS OLD
This rat had no vitamin G and weighed only 63 grams. Note loss of hair and emaciated condition. The same rat below, 6 weeks later, after receiving food rich in vitamin G. Its weight was then 169 grams.

Dept. of Commerce

New Vitamin B Data Indicates Importance of Balanced Diets

An important scientific news event of 1937 was the announcement that nicotinic acid had been identified as a member of the Vitamin B complex. This coupled with reports that the nicotinic acid itself had been used to make dramatic cures of human pellagra has focussed more sharply than ever before, the eyes of the scientific world on the role of Vitamin B complex in the human dietary.

The photo above illustrates some of the effects of Vitamin B complex deficiency in rats and the improvement which can be accomplished by proper diet.

Feeling that a review of recent progress in this field is of more than general interest, U.S.I. is publishing this month in its companion publication ALCOHOL NEWS an article on Vitamin B complex and its relation to human and animal nutrition. Copies of ALCOHOL NEWS containing this article may be secured by writing to U.S.I.

ADVERTISEMENT—*This entire page is a paid advertisement.*

FEBRUARY ★ **SOLVENT NEWS** ★ 1938

Masks Paint Odors By Adding Combination of Aromatic Substances

BALTIMORE, Md.—An entirely new approach to the problem of masking paint odors is claimed in a patent recently granted to a chemist of this city.

The method described in the patent recognizes the fact that different components of paint have different drying speeds. For example, the thinner may dry in about 2 hours whereas the oil may take 48 hours.

To overcome this effect the inventor adds to the paint "an odor-masking composition made up of a number of odor-masking substances which are of progressive volatility and which volatilize at the same rate as the various odor-emitting phases of the paint."

For example, to mask the odors of a flat wall paint composed of pigment, spar varnish, heat-bodied linseed oil, mineral spirits and dryer, the inventor uses one part of the following fragrant composition to 1300 parts of the paint, by weight:

	Parts by wt.
1. Amyl butyrate	6.0
2. Benzyl acetate	21.6
3. Phenyl ethyl alcohol	31.2
4. Citral	5.6
5. Geraniol	20.0
6. Phenyl acetic acid	7.8
7. Coumarin crystals	7.8
	100.0

According to the patent, "Ingredients 1, 2, 3, and 4 will volatize during the two hours it takes for the mineral spirits to evaporate. During this time, these ingredients will mask the odor of the mineral spirits and then disappear.

"When the oxidation odor is emitted, it will be masked by ingredients 5, 6, and 7. The geraniol is effective during the early hours of oxidation when the odors are most pungent. The fixatives have a faint sweet smell which will overcome the decreasing odors of the paint until 48 hours after the initial brushing, all odors will have completely disappeared. The odors of ingredients 5, 6, and 7 decrease in intensity at the same rate as the oxidation odor with the result that at the end of the 48-hour period, there will not be present any odor due either to the paint or the masking agent."

Shipments of Pyroxylin Textiles Increase in '37

WASHINGTON, D. C.—Shipments of pyroxylin-coated textiles for the first eleven months of 1937 were valued at $21,513,417 as compared with $18,999,274 during the same period of 1936, according to Director William L. Austin, Bureau of the Census, Department of Commerce.

Apparently part of this increase in value is due to higher prices since the 1937 value was 113% of 1936 whereas shipments of light goods, '37 compared to '36, were 109% and of heavy goods 111%.

Ethyl Formate Now Made By U.S.I.; Aids Synthesis

(*Continued from previous page*)

medicine include applications as a diuretic, an antiseptic, a rubefacient, and a hypnotic.

Probably one of the most promising adaptations of Ethyl Formate lies in the field of organic synthesis. To synthesize vitamin B_1, one manufacturer has adopted a method which starts with Ethyl Formate and ethyl beta-ethoxypropionate. The crude derivative of this reaction is converted by successive steps into the purified crystalline vitamin.

Certain other syntheses using Ethyl Formate employ the Claissen reaction. Because of the great reactivity of the keto and carboxy aldehydes produced, this reaction is seen as a stepping stone to further synthesis.

Some Ethyl Formate is used as an active solvent for cellulose esters and ethers where its hydrolysis in water is not a drawback. It is also soluble in most organic solvents.

Further information may be secured by writing to U.S.I.

Varnishing Damp Surfaces

For varnishing damp surfaces it has been suggested that a small amount of water-soluble alcohol be added to the thinner of the varnish. The alcohol will unite with the moisture on the surface of the wood and disappear with the thinner, it is said.

Two new oils, from elderberry seeds and from elm tree seeds, have been extracted by the chemistry department of one of the leading universities. The elderberry seed oil, it is stated, dries in less time than is required for linseed oil. The oil from elm tree seeds is believed to be of use to soap manufacturers because of its fatty acid content.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

Swelling, shrinking and checking of wood can be prevented by dipping, brushing or spraying with a new liquid material, the manufacturer states. The liquid is colorless, has no offensive odor, and treated surfaces can be finished or painted in the usual manner, it is claimed. **(No. 61)**

U S I

Double Refined Candelilla wax, said to be a substitute for Carnauba Wax, is now on the market. The manufacturer states that tackiness, moisture and foreign matter is removed to such an extent in the refining process that the finished product is being used as a full, as well as partial substitute for Carnauba. **(No. 62)**

U S I

In a new filter, for chemical solutions which must not touch metal, all parts coming into contact with the liquid are made of a high grade of hard rubber, according to a recent description. **(No. 63)**

U S I

A new paint containing finely-divided metallic zinc in a weather-resistant vehicle is said to be suitable for both the primer and finishing coat on any metallic surface. The finished appearance is battleship gray and resists atmospheric attack so no overcoating is required, the manufacturer claims. **(No. 64)**

U S I

Glass that transmits only ultra violet light and is opaque to the visible portion of the spectrum is now available in commercial (blown) quality, according to a recent announcement. When used with an ultra violet source this black filter permits the manufacture of an inexpensive medium to determine fluorescence, it is claimed. **(No. 65)**

U S I

A fabric-protecting material introduced recently is said to impart a water-repelling, soft-handle finish that resists washing, boiling soap solutions and dry cleaning. The manufacturer states that the material can be applied to all types of fabrics but recommends it particularly for cotton and linen dyed with fast color or not dyed. **(No. 66)**

U S I

Liquid flame proofing material which can be mixed with paint or used directly on fabrics was reported recently. The material is said to be colorless and odorless. **(No. 67)**

U S I

A new vegetable adhesive has been developed for sealing the new types of Kraft containers and ordinary corrugated shipping cases. The adhesive can be kept for a considerable time without crusting over and it is not injurious to the skin or clothing, the manufacturer reports. **(No. 68)**

U S I

For measuring the stiffness of sheet materials such as paper, textiles, plastics, rubber, leather, etc. (and of wires, yarns, bristles, etc., by using special holders) a new "stiffness tester" is said to give numerical values for rigidity, yield points, elastic recovery and other measurable properties. **(No. 69)**

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DIETHYL CARBONATE

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ISOPROPYL ACETATE
AMYL PROPIONATE
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CHEMICAL INDUSTRIES

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Creating Industries: 1918-1938

IT is twenty years since the close of the World War and twenty years are a business generation. During these two decades chemical science, both theoretical and applied, has made greater advances in more fields than that in any similar period, and chemical industry likewise has enormously expanded and diversified. What are the net results of this great chemical progress?

It is quite appropriate, at this time and in our pages, to render a realistic account, stripped bare of popular poppycock, devoid alike of propaganda and prophecy, of our chemical achievements since the War, so with the cooperation of fifty nationally known authorities we shall submit to you fifty factual reports on American chemical accomplishments since the World War.

This series of fifty articles starts on the following page. It will be continued throughout the year.

From fertilizers to perfumes, biological as well as electrolytic chemicals, laboratory reagents to detergents, tanning, dry cleaning, rubber compounding, finishing metals and finishing textiles, sanitation and flotation, inks and glass, alloys and plastics, abrasives, adhesives, refrigerants—in every industrial field the results achieved by chemical means will be appraised by distinguished experts. In each chapter the technical developments will be briefly, clearly reviewed as foundations of economic progress in new products, improved goods, lower costs. Since the War our chemical industry has moved forward through boom times and depressions and in contradiction to current theories of abundance through restricted output and inflated prices.

Technical progress is promptly, competently recorded in our technical journals; but such a factual report with expert appraisal of this economic progress serves today an important double purpose. None of us can keep informed of these industrial ramifications in all fields. All of us need to keep before us just such vivid examples of the economics of abundance which creates more work to be done, more wealth to distribute.

Ammonia and Nitric Acid 1918-1938

By Dr. Louis C. Jones
Nitrogen Engineering Corp.

Fixed nitrogen began a new chemical technique and has revolutionized both agricultural and political economics.

TIME did not begin and will not end. Matter cannot be destroyed and was not made. It always was and will be. The universe in boundless space is permeated by light a billion years on its way to us from the farthest star, with at least an equal distance yet to go beyond. In the meantime other rays have been going on their two billion year journey in the opposite direction and a void which will not carry it or a barrier which will stop it, we cannot imagine. All this space it seems is filled with other stars and worlds made of essentially the same elements, including nitrogen, which we know on our little planet, the earth. Wherever propitious, as here, these stellar, cosmic or other rays, coming through the weightless ether of space at absolute zero have kindled life which in spite of surprisingly narrow limiting conditions on our earth somehow began, developed, exists and changes eternally.

For example, more than half the weight of the earth's crust is oxygen but there is only a tiny fraction of the total, left over in our air, uncombined after all mineral elements have been oxidized to make rock, all carbon to make limestones and all hydrogen to make our oceans, lakes and rivers.

Besides also there is left just a trace of carbon dioxide not yet taken up by the alkalies of decomposing silicates. It is just this small portion of oxygen left over that lets us live and this tiny remnant of carbon dioxide which permits plants to grow and has given us back coal and oil for fuel and power to make nitrogen fixation easy and life more enjoyable.

Furthermore, had the earth's nitrogen been reactive and not inert, the last trace of our oxygen would have been consumed and life impossible. It is therefore just this reluctance of the element nitrogen to combine even with oxygen that has permitted our existence and now that we have learned to "fix it" artificially, science deserves the credit for having made real, not visionary, progress toward the more abundant life about which non-scientists speak so much.

At any rate and fortunately, nitrogen is tremendously inert and yet in this atmosphere of nitrogen and oxygen above the earth's crust at first fused, then cooled and sterile, life somehow developed, we know not how. Some vibrant form of energy, whether cosmic or stellar, has kindled the synthesis of let us say a protein molecule, then a cell. Living organisms then contributed to fix nitrogen as required—lightning too may have helped—and so life and evolution began.

Man has learned only recently to use nitrogen. Though prehistoric man may have known nitrate in caves and cellars, the Chinese are reported first to have utilized it in flaming powders. Later Europeans put it in guns to make, save and destroy empires. Natural nitrate from Chile was first exported in 1830, but not until Liebig in 1850 found its worth in artificial fertilizer did the nitrogen industry really begin. Later, at the end of the last century, the Chile product, then dominant, was supplemented by development of ammonia recovery as a by-product in the manufacture of coke for making iron. About the same time, after a start in America, Norway developed the arc process to be followed a few years later in Germany by cyanamid. Nevertheless Chile continued to supply the great bulk of fixed nitrogen until 1913, when Badische with Haber prepared Germany, if cut off from Chile, to carry on the great war.

Synthesis of ammonia on a commercial scale started with the Haber process at Oppau in Germany and Professor Ostwald just from this plant declared enthusiastically to the writer at the Solvay Jubaleum in Bruxelles in November 1913 that "This is the most marvellous technical achievement of modern times—an industrial process in operation at a temperature of 500° C. under a pressure of 200 atmospheres. I am greatly honored to have seen it."

The Oppau operations were duplicated on a much grander scale in Merseburg in 1917 to supply practically all Germany's war and other needs, had the war continued. Naturally after the war these plants entered into competition with all other existing nitrogen sources. In spite of war plants started in various countries there were no other commercial synthetic plants till 1921 when one at Syracuse, and thereafter others, began to be built rapidly throughout the world. These synthetic ammonia plants have supplied all our demands and replaced much formerly obtained from Chile and by the arc process in Norway. The latter has, in fact, largely diverted its power to make far greater quantities by synthesis than formerly in the arc.

Briefly, in the presence of an iron catalyst nitrogen

and hydrogen in the ratio of 1 to 3, say under a pressure of 3,000 lbs. per square inch, burn with heat enough to maintain combustion and when the residual gases are cooled the product ammonia liquefies and runs off to storage tanks. It is simpler than burning gas under a boiler, largely because two pure gases combine to give one pure product.

Furthermore the production of the raw materials, hydrogen and nitrogen, are almost equally simple. If we have not cheap electric power with which to produce hydrogen from water, we pass air and steam over hot coke and then through another catalyst to convert continuously all the oxygen of the steam and air into carbon dioxide, leaving hydrogen and nitrogen in the correct proportions to make ammonia. We then wash out under pressure the carbon dioxide with water and some impurities with copper solution and feed the residue of pure gases into a system circulating these gases through the catalyst burner without interruption to produce liquid ammonia in amounts exactly equivalent to the gases "burned."

With good catalysts, good equipment, good materials, good engineering, good control and a market or use for the product, operations go on almost uninterruptedly. There is no scaling, no plugging of pipes, no corrosion and no residues other than a tiny bit of argon to be vented to the air. Chemically pure hydrogen and nitrogen combine completely to produce a chemically pure liquid product flowing to storage.

No revolutionary technical improvements in nitrogen fixation have been made since the great war. In fact the great German war plants at Oppau and Merseburg are still operating practically unchanged. Other systems have developed refinements, using higher pressures than originally used in Germany, but still two to three hundred atmospheres are generally considered more economical.

There have been developed also, first I believe in the United States, refinements in gas purification and analytical control to enable practically continuous operation in great converters without interruption or catalyst renewal. For special conditions, purification of synthesis gases by washing with liquid nitrogen has also found commercial application. Converters forged from a single chrome vanadium or chrome nickel ingot now produce daily up to 80 or more tons anhydrous ammonia. Analytical methods enabling gas impurities to be maintained at 30 parts per million or lower, adapted to recording instruments, enable uninterrupted operation and practically indefinite catalyst activity.

These refinements and perfection in mechanical details in compressors, absorbers, interchangers and converters have greatly reduced the most important items of cost, i.e., those of investment and maintenance, in the manufacture of synthetic ammonia. Processes for production of synthesis gases from by-product coke ovens and even from coal have been put into operation where these materials are more economically available than coke and electrolytic hydrogen.

Nitric Acid

The Ostwald process for oxidizing ammonia to make nitric acid, first installed at Hamm, Germany and in Ville Vorde, Belgium were visited by the writer in 1913. Later other catalysts than platinum and better uses of platinum were developed, but particularly important is the method, now generally followed, whereby the whole nitric acid oxidation and absorption equipment is made of chrome nickel steel, enabling operation at high pressure, in smaller equipment to produce also higher strength acid. Lower yields, first obtained when oxidizing ammonia under pressure, have been overcome by the use of multiple layers of platinum rhodium gauze.

The water condensate with its small content of nitric acid, necessarily produced in ammonia oxidation, is now generally introduced at the proper point in the absorbing system (replacing water) and enables the production of still higher acid strength.

These developments in ammonia synthesis and in nitric acid have made possible artificial nitrate of soda and nitro-chalk and saved much cost in concentration of nitric acid, thus adding further to the distress of the Chile nitrate industry in spite of great advances made by the Guggenheims over the old Shanks process.

New Fertilizer Forms

Outside of technical advances in methods of manufacture, most important improvements have been made in the production of fertilizer forms less expensive to make, better for the soil and easier to apply, generally granulated, dust free and little hygroscopic. Chile nitrate and artificial sodium nitrate as well as cyanamid and acid phosphate are now available in granulated, dust free condition.

Where gypsum or waste sulfur gases are available from smelter operations and of course from by-product operations, sulfate is still made in great quantities. In fact in many cases, and especially for rice fertilization, it is still preferred. Actually nearly half of all fertilizer nitrogen is still used as sulfate.

Ammo Phos also is produced in increasing amounts, especially where sulfuric and phosphoric acid are economically available, for example at Niihama in Japan and at the Trail plant of the Consolidated Mining & Smelting Company of Canada. The output of calcium cyanamid too, in spite of competition of synthetic products, has continued to increase. In granular form, dust free, non-hygroscopic, with beneficial lime content and ready for application, without other carrier, its production has greatly increased along with other synthetic fertilizer products. Cyanamid nitrogen production now greatly exceeds the output from Chile. Also cyanamid as a source of cyanides for the mining industry and for insecticides and fumigants and for other organic products has become of increasing importance.

See photographs of world's newest nitrogen plant on page 163, this issue.

One of the most important developments in fertilizer production has been in the utilization of ammonium nitrate in combination with ground limestone to give nitrate fertilizers containing both nitrate and ammonia nitrogen with beneficial lime carrier. These nitro-chalk types of fertilizers are valued as high as other nitrates and require only calcium carbonate as a carrier instead of the generally more expensive sulfuric acid or alkali. Due to their content of lime and both ammonia and nitrate nitrogen and to the economies in manufacture (only one-half the ammonia requiring oxidation), the nitro-chalk type is in Europe steadily replacing other nitrogen fertilizers and its production is approaching the output from Chile.

Ammoniated super-phosphate is a comparatively new fertilizer material and serves to utilize a considerable tonnage of ammonia in neutralizing the surplus acidity in super-phosphate.

New Uses for Liquid Anhydrous Ammonia

Since synthetic ammonia has become abundant and cheap, equipment for storing and transporting it has been perfected to replace the small cylinders formerly used. Now it is commonplace to store and ship it in tank car lots with as little concern as some other common liquid or solution. The accumulated experience in handling liquid anhydrous ammonia and its low cost has brought forward numerous suggestions for its use as a solvent, a medium of chemical reaction, and as a dehydrating agent. In this field large industrial uses of ammonia may develop rapidly.

Other New Nitrogen Products

Urea, originally predicted to be an almost ideal fertilizer material, has so far failed to find a large place in this field. However, one of the large producers of synthetic ammonia in the United States is now offering urea of fertilizer grade for only a little above the price quoted per unit of nitrogen in sulfate of ammonia and other nitrate fertilizers.

Earlier high operating and maintenance costs in producing urea, though requiring as raw material only ammonia and waste carbon dioxide, together with the sales resistance due to its high concentration and tendency to absorb moisture, has heretofore prevented its serious competition with the other largely used fertilizers. Earlier suggestions, however, to combine it with ground limestone or other material to reduce its nitrogen content and decrease its tendency to take up moisture may yet be realized. As a raw material in the manufacture of synthetic resins and various organic chemicals, urea has become of increasing importance and a growing consumption is confidently predicted.

Earlier prophecies that ammonium chloride produced as a by-product in the ammonia soda industry might become competitive in the fertilizer field with sulfate of ammonia have not so far been realized. In some seasons and climates and on some soils and crops it has not proved equal to sulfate, which also under favorable conditions, for example, from gypsum and waste smelter gases, can be produced more cheaply.

By-products of Ammonia Synthesis

The use of carbon dioxide, nearly pure, in tremendous quantities, a by-product in the manufacture of synthetic ammonia from coke, was once thought to forebode a revolutionary change in the ammonia soda industry, provided, of course, uses could be found for corresponding quantities of ammonium chloride.

This has not taken place because generally synthetic ammonia plants and alkali plants are best located separately, the first near cheap fuel and the second near rock salt. Besides, the use of ammonium chloride as a fertilizer, as already stated, has not reached important proportions. Neither have the ammonia plants been located generally near enough to the market to make the production of great quantities of dry ice economical.

Perhaps the most important commercial by-product in the synthetic nitrate industry has been undertaken by the Atmospheric Nitrogen Company at Hopewell, Va., to produce sodium nitrate direct from salt and nitric acid with the resulting by-product, chlorine gas. Here is a big stake—cheaper salt replacing soda ash with recovery of chlorine to give a most important credit to these operations. At the present time, however, it is not known how successfully the tremendous difficulties of separating oxides of nitrogen and chlorine have been overcome.

An interesting by-product from ammonia plants using electrolytic hydrogen, as at Nottoden, Norway, is the heavy water left in the electrolytic cells, but this is, of course, so far only of use for experimental purposes.

When water is electrolyzed to produce hydrogen and nitrogen is obtained by air liquefaction, large quantities of oxygen are produced which still await utilization at the point of production.

Munitions Consumption Small

Despite the outpourings of glib demagogues, the nitrogen industry cannot be honestly characterized as a "death dealing, munition making, war profiteering" occupation. As a matter of fact the world's consumption of nitrogen products is authoritatively estimated for 1936 and 1937 at 2,675,000 metric tons of nitrogen of which 2,344,000 tons were consumed in agriculture. Of the remainder, industry consumed by far the greater portion, leaving but a small percentage for use in the manufacture of explosives. In addition, a very high percentage of all explosives is used industrially in mining, quarrying, road building, hydroelectric installations, etc. The consumption of nitrogen in munitions (and who dare be the first to do without them) even in war time can therefore be but a small part in the great nitrogen industry which represents perhaps a total of ten million tons annually in the form actually used.

It is interesting to note that the estimated plant

capacity for producing synthetic ammonia throughout the world is nearly double the present ability of agriculture and industry to consume. This over-building to a large extent has been brought about by nationalism stimulated by world unrest and fear.

The actual world consumption of fixed nitrogen products, however, since 1925 has practically doubled, while during the same period the cost per ton of nitrogen to the consumer has decreased to less than one-half. Naturally such profound changes in an essential world industry have had important economic results everywhere.

Early this century we were warned that the earth's population was to be limited by decreasing soil fertility with ultimate starvation staring us in the face. But we did not foresee the processes of Frank and Caro (cyanamid) and of Haber giving us limitless supplies of fixed nitrogen. Nearly all great industrial nations, with the exception of Spain, Egypt, Mexico and South American countries, now have adequate capacities to produce fixed nitrogen for all industries and agriculture and for any emergency.

We no longer care how long Chile nitrate lasts nor whether battleships interrupt its export. Of the other two principal fertilizer products, phosphates and potash, also adequate natural deposits have been developed within the United States to last for centuries. Technology has therefore saved our bodies, but we in the United States have almost lost our economic heads. We now worry about too much food; we pay the farmer to produce less and offer him cheap fertilizers with which to produce more; we build dams for soil conservation, for irrigation, for navigation and for power but not knowing how to charge the cost, promise that somehow future generations will pay for it.

The industrial changes brought about primarily by the Haber process have been tremendous, with Chile perhaps the greatest sufferer and politics the world over have been influenced even more as a result of our escape from essentially one source of fixed nitrogen, that is, Chile. Developments in artificial nitrogen fixation have made the "freedom of the seas" for nitrates, both to supply the needs for crops and for war purposes, no more a national necessity. In fact, I suspect Great Britain was decoyed into a let down in naval building through reliance on her great nitrogen plants at Billingham. Subsequently, however, a little late, she has realized that in modern industry and warfare, oil is fully as important as nitrates.

The technique, experience, and equipment developed in the synthetic nitrogen industry have brought measurably nearer the economic production of synthetic petroleum and have also made possible large scale production of methanol and other synthetic organic products.

England, Italy, Germany and Japan must bring oil overseas or synthesize it from coal. All these countries

Report of British Sulfate of Ammonia Federation, Ltd. For 1936-1937

World Production and Consumption of Pure Nitrogen for the Fertilizer Years

(In thousands of metric tons)

Production:	**1927-28**	**1928-29**	**1929-30**	**1930-31**	**1931-32**	**1932-33**	**1933-34**	**1934-35**	**1935-36**	**1936-37**
Sulfate of Ammonia:										
By-product	368	376	425*	360	302	258	307	321	376	407
Synthetic	367	485	442	349	522	560	535	533	630	654*
	735	861	867	709	824	818	842	854	1,006	1,061*
Cyanamid	198	192	264	201	134	168	195	232	269	285*
Nitrate of Lime	105	136	131	110	79	118	107	153	156	159*
Other forms of Nitrogen:†										
Synthetic	242	383	427	393	348	462	516	607	724	843*
By-product	54*	51	51	31	30	40	48	45	46	40
Chile Nitrate	390	490*	464	250	170	71	84	179	192	206
Total production	1,724	2,113	2,204	1,694	1,585	1,677	1,792	2,070	2,393	2,594*
Percentage Increase or Decrease	+30.4%	+22.6%	+4.3%	—23.1%	—6.4%	+5.8%	+6.9%	+15.5%	+15.6%	+8.4%
Consumption:										
Manufactured Nitrogen	1,249	1,453	1,587	1,377	1,417	1,620	1,714	1,877	2,201	2,433*
Chile Nitrate	393	419*	364	244	138	127	164	195	216	242
Total consumption	1,642	1,872	1,951	1,621	1,555	1,747	1,878	2,072	2,417	2,675*
Percentage Increase or Decrease	+20.2%	+14.0%	+4.2%	—16.9%	—4.1%	+12.3%	+7.5%	+10.3%	+16.7%	+10.7%
Agricultural consump. about	1,460	1,670	1,750	1,455	1,412	1,586	1,673	1,812	2,084	2,344*
Percentage Increase or Decrease	+22.7%	+14.4%	+4.8%	—16.9%	—3.0%	+12.3%	+5.5%	+8.3%	+15.0%	+12.5%

* Highest figure ever reached.

† Including nitrogen products used for industrial purposes (except Chile nitrate) and ammonia in mixed fertilizers.

NOTE.—Fertilizers are included in these tables under the final form as sold, so that, for example, cyanamid if converted into sulfate of ammonia is included under synthetic sulfate of ammonia, or, if into ammophos, is included under other synthetic nitrogen.

are now feverishly, though uneconomically, beginning to produce synthetic petroleum on a grand scale. If the great industrial nations now without oil resources ultimately succeed as well in the synthesis of petroleum as has been done in ammonia, technology will have taken another long step toward an era of world peace.

The day will come eventually through improved technology and through exhaustion of the natural product, perhaps in the next generation, when synthetic petroleum will become as available everywhere as is fixed nitrogen produced by synthetic processes now. Economic production of synthetic motor fuels, absolutely essential for transportation by ships, trucks, airplanes, and tanks, is advancing so rapidly that there is sound reason to look forward to a gradual lessening of the present international hysteria of distrust based on fear and envy. It is, nevertheless, unfortunate that through fear nations now feel obliged to pay doubly for all of the petroleum produced synthetically. Ultimately, however, and perhaps earlier than expected, improvements in this industry will produce petroleum products and perhaps by-products to fill some new and important need and thus make possible competition with natural petroleum. At any rate every ton produced synthetically postpones the final exhaustion of the world's marvellously valuable natural deposits and so prolongs our present "more abundant life," too little appreciated.

Summary

1. Technical progress in the nitrogen industry since the great war has been steady and rapid but not revolutionary.

2. Synthetic ammonia costs due to refinements and especially continuous operation in large units are perhaps only one-half those of 1918.

3. Great advances have been made in the manufacture of nitric acid and nitrates from ammonia made through the use of new alloys withstanding corrosion and permitting operation under pressure in metallic equipment.

4. New fertilizer forms are products easier to transport and store, better and more available for the crops.

5. Due to these developments production in Chile and from the arc process in Norway has greatly decreased, while the synthetic products, ammonia and calcium cyanamid, have increased.

6. The cost of nitrogen products has decreased by one-half while the consumption for all purposes has more than doubled since the war, and the world's producing capacity is still very largely in excess of requirements.

7. Freedom of the seas for Chile nitrate has now become a problem of freedom for oil transport or the alternative, production synthetically.

8. Ammonia synthesis has made possible the synthesis of urea, methanol, and other products and is pointing toward economic synthesis of petroleum-like materials.

Industry's Bookshelf

Procter's Leather Chemists' Pocket Book by W. A. Aetkin and F. C. Thompson, Chemical Publishing Co., N. Y., 394 pp., $6.00. A third edition of this practical handbook of standard analytical operations for tannery control.

Labor Conditions in Western Europe by Jurgen Kuczyski, International Publishers, N. Y., 118 pp., $1.50. A gloomy conclusion from labor's point of view is reached after a study of wage, and hour statistics, in England, France and Germany from 1820 to 1935.

When Labor Organizes by Robert R. R. Brooks, Yale Press, 361 pp., $3.00. Required reading for every executive who wants to understand the present day labor situation: highly readable in style, and a keenly sympathetic, fair-minded point of view.

Economic Development of Germany Under National Socialism by Vaso Trivanovitch, Nat'l Industrial Conference Board, N. Y., 141 pp., $3.50. A strictly objective study of practical collectivism in German economics with appraisal of results obtained in rearmament and economic self-sufficiency.

Introduction to Physical Chemistry by F. A. Hilbricht, J. M. Jensen, London, 368 pp., 5 shillings. A painstaking, straightforward, concise exposition for first year students.

General Chemistry by H. I. Schlesinger, Longmans, Green, N. Y., 857 pp., $3.50. A third and virtually new edition of the standard textbook emphasizing theory that matter is essentially molecules in motion with much new correlating material upon the basis of the energy of reactions.

Atomic Artillery by John K. Robertson, Van Nostrand, N. Y., 175 pp., $3.75. A thoroughly non-technical account of sub-atomic phenomena explained crisply and with great clarity.

Methods of Quantitative Chemical Analysis by M. G. Mellon, MacMillan, N. Y., 456 pp., $3.00. A thoroughgoing textbook of both theory and technique.

Atomic Spectra and Atomic Structure by Gerhart Herzberg, trans. by J. W. Tinks, Prentice-Hall, Inc., 70 Fifth ave., N. Y., 257 pp., $4.25. An introduction to the study of atomic spectra adapted for the beginner and useful to non-specialists in the field of direct applications.

Mineral Raw Materials by the Staff of the Foreign Minerals Division, U. S. Bureau of Mines, McGraw-Hill, N. Y., 342 pp. On the data of 1934, taken as the low point of the depression, this finely organized book surveys the sources of thirty-two metals and their commerce in the twelve leading industrial countries of the world—a feature is the excellent charts showing the flow of metals in commerce.

Business Under the New Price Laws by Burton A. Zorn and George J. Feldman, Prentice-Hall, N. Y., 463 pp., $5.00. The Robinson-Patman Act and the state fair trade and price fixing laws obviously usher in a new era in price legislation which is here subjected to painstaking, practical study. The urgency of knowing positively what can and cannot be done under these new laws makes the work of exceptional and timely importance.

Chemicals Revolutionize the Dry Cleaning Industry 1918-38

By Edgar R. Clark

Chemical Engineer, U. S. Hoffman Machinery Corp.

NO machine, no cleaning liquid, no detergent, and no system of operation standard in the dry cleaning industry twenty years ago is now in use. Indeed, even within the last ten years there have been sweeping changes made to improve and to increase output, and to alter the commercial aspects of the business profoundly. The general public retains some peculiar notions as to the methods employed in dry cleaning. These are perhaps excusable in view of the newness of the art. However, that dry cleaning is a chemical industry using large amounts of chemical raw materials and employing much chemical engineering equipment are facts which curiously seem to have escaped notice in scientific and industrial circles.

Dry cleaning statistics are difficult to secure with precision, as dry cleaners perform various other services (pressing, repairing, and storage) or are intimately associated with laundries in many cases. However, it has been estimated that the retail value of dry cleaning in the United States alone exceeds $400,000,000 annually, and that over 120,000 people are employed in over 12,000 separate establishments. The purchases of cleaning liquids and supplies for dry cleaning exceed $30,000,00 per year, and new machinery is bought to the extent of $15,000,000, or more, annually. The trades allied with dry cleaning in that they furnish the necessary equipment and materials provide employment for an additional large number of persons.

The social importance of the industry is a theme which could be considerably expanded as dry cleaning service has become essential to our standard of living. However, the technical significance of the methods of dry cleaning to the far larger industries of manufacturing textiles and particularly those used in outer apparel is of more immediate interest. It behooves every manufacturer of textiles, of clothing, of textile chemicals, and of dyes and finishing agents to acquire a sympathetic, intelligent understanding of the art of dry cleaning to the end that serviceability as well as beauty shall characterize their output. A description of the modern art of dry cleaning should start with descriptions of the liquids employed; these are usually called "solvents" within the industry.

Dry cleaning is the process of cleaning clothing and the like by immersion, agitation, and rinsing in a non-aqueous liquid known as the solvent. This definition does not entirely satisfy. The dry cleaner may, and often does, supplement the "dry" treatment of clothing in bulk with local spot-removal processes involving the use of water alone or in combination. He may even immerse individual garments in water and aqueous solutions under conditions appropriate for the relatively delicate materials. Hence, a dry cleaner is, strictly speaking, a qualified expert in the renovation of clothing, especially of types which would be injured unduly by mechanical washing in soap and water, etc., as in laundering, and the art he practices is as a whole properly called dry cleaning in view of established trade customs. However, the bulk usage of non-aqueous liquid is the back-bone of his operations, and the solvent used is an elementary consideration.

Dry cleaning solvent must on the one hand be effective and adequate for the purpose without significant damage to colors, finishes, creases, pleats, or trimming materials, and on the other hand be removable from the articles and recoverable for further use. Of the then available liquids, the industry agreed twenty years ago that a relatively light type of petroleum naphtha, which would evaporate freely from the garments, was the only one suitable. This was explosively inflammable, and the amount of destruction of life and property which accompanied its use in dry cleaning was appalling. It was also difficult to secure in adequate purity.

In 1925, a group of dry cleaners started to use a heavier naphtha and early in 1928 the specification known as Commercial Standard 3-28 of the National Bureau of Standards was promulgated. This specification, now slightly amended as Commercial Standard 3-38, covers a naphtha characterized primarily by a flash point above 100° F. as determined in the Tag closed cup tester; this requirement has been of enormous humanitarian and economic value in reducing the hazards, particularly of explosion. Otherwise the specification calls for an end point in A.S.T.M. distillation below 395° F., 50 and 90 per cent. points below 350 and 375° F., respectively, a maximum of 5 per cent. by volume soluble in 94 per cent. sulfuric acid, and negative doctor, copper strip corrosion, and non-volatile

acidity tests together with color and odor limitations. Such solvent is now offered by over fifty producers in the United States and is known as Stoddard solvent after W. J. Stoddard of Atlanta, Ga., who pioneered in its introduction.

Introduction Stoddard Solvent

The chief difficulty in introducing Stoddard solvent was, of course, its slow evaporation rate as compared with the light naphthas. This slower evaporation made it necessary to speed up the drying devices, which in the preferred form are of the down-draft, once-through, adiabatic type, using large volumes of non-recirculating air at temperatures approximating 150° F. Explosion hazard is minimized in such devices primarily by keeping the vapor concentration well below the explosive range. The introduction of Stoddard solvent also necessitated changes in distillation equipment as discussed below. Most dry cleaning in the United States is done today with Stoddard solvent.

In other countries somewhat different naphthas are used. Thus in Canada, Australia, and South Africa a 95° F. flash material is considered adequately safe. In Great Britain "white spirit" of somewhat longer distillation range than Stoddard solvent is in common use, and in France and elsewhere solvent naphthas of the benzol type are used to some extent with or without added petroleum naphtha.

In Germany, however, and elsewhere, trade barriers and the desire to use domestic chemicals led to the introduction some ten years ago of synthetic chlorinated hydrocarbons for dry cleaning, and in the United States they have been promoted since about 1930 in part, at least, as outlets for electrolytic chlorine. Those in most common use are carbon tetrachloride, trichloroethylene, and perchloroethylene. These liquids are undoubtedly non-flammable and they evaporate freely from the clothes. However, their volatility, high density, and high cost per pound require the use of closed machinery operating in complete cycles including washing and drying, while their tendency to sufficient hydrolysis in the presence of moisture to cause corrosion has introduced special problems. Moreover, the toxicity of the vapors in concentrations apt to form in work-rooms is a serious matter, and trichloroethylene, particularly, has been found to remove some types of acetate rayon dyes.

Practical experience seems to demonstrate that the solvents in common use are all about on a par as regards actual detergency, but that specific plants using either synthetic or petroleum solvents vary in cleaning efficiency according to the method of operation. That is, equipment of either type used with a sufficiently prolonged washing period, a sufficient amount of suitable and compatible cleaning aid, and an adequate amount of rinsing in pure solvent gives excellent results, and the nature of the solvent cannot be distinguished in the finished work. Anything less than this ideal in any plant must, of course, compare unfavorably with ideal operations.

Properties of Bulk Dry Cleaning Solvents

	Stoddard Solvent	*140F. Solvent*	*Carbon Tetrachloride*	*Trichloroethylene*	*Perchloroethylene*
Chemical Formula	...	...	CCl_4	$CHClCCl_2$	CCl_2CCl_2
Density, pounds per gallon	6.5	6.5	13.3	12.3	13.5
Boiling point, ° F.	300-400	360-400	170	188	250
Vapor press. at 68° F., millimeters of mercury ...	<4	<4	91	56	17
Latent heat vaporization, B.T.U. per lb., at mean b. pt.	102	100	84	104	91

Synthetic solvent dry cleaning has been particularly interesting to laundryowners, who have found in dry cleaning a commercial opportunity to compensate for the losses in family business resulting from various economic factors. Laundryowners prefer to conduct the dry cleaning on the laundry premises, which until recently has often required the use of a non-flammable solvent to avoid excessive increases in fire insurance rates.

Within the last three years equipment which offers the chemical advantages of petroleum naphtha and is at the same time sufficiently less dangerous than Stoddard solvent to permit its use without excessive insurance expense or risk of loss, has been devised. This is called 140-F equipment from the fact that it uses petroleum naphtha of a minimum flash point of 140° F. If used with suitable drying devices which evaporate the bulk of the solvent below its flash point, 140-F solvent dry cleaning machinery may often be installed with little or no effect on insurance premiums covering other occupancies. This solvent has a very short distillation range. For it, an initial boiling point and end point in A.S.T.M. distillation of 360 and 395° F., respectively, is specified.

Soaps and Cleaning Aids

Much effort has been applied within the past twenty years to the improvement of dry cleaning soaps and related substances, and considerable progress has been made along two lines. First, changes in soap formulation made necessary by the introduction of new solvents and new methods of solvent reclamation; and second, improvement in detergent action and extension of the range of effective dry, as opposed to wet, cleaning.

Changes made necessary by new solvents were rather obvious. Stoddard solvent should not, for example, be diluted by any low flash point materials used in soap formulation; consequently light naphthas, and benzol and its lower homologs were ruled out. Carbon tetrachloride, on the other hand, should not be diluted with any ingredient in a soap which can potentially provide an explosion hazard. It is agreed that mixtures of

flammable and non-flammable solvents are not safe. The newer 140-F plants also require their special soaps.

The changes in soaps required by new methods of solvent reclamation are of special interest. Prior to the introduction of the present large filters, the most successful method of dry cleaning was the continuous chemical clarification system. In this, the solvent in the washer was continuously withdrawn, circulated upward through a tank filled with solvent, except for a charge of concentrated caustic soda solution in the bottom, and returned to the washer. This circulation was continued until the solvent in the washer was clear. Soap of the types then in common use was "super-fatted" or acid in that it contained more than the theoretical amount of fatty acid to neutralize the alkali used in its manufacture. When such soap dispersed in solvent was passed through caustic soda it was neutralized, rendered insoluble, and flocculated in the form of a relatively tough bed which floated on the caustic solution below the solvent. Caustic solutions also flocculate dirt in suspension in solvent and the soap bed aided by this effect acted as a sort of semi-liquid filter medium. From another viewpoint, the action was not dissimilar to that of alum and soda in water purification. Abandoning continuous caustic clarification for continuous filtration, it was found that such soaps in surprisingly low concentration clogged the filters. To meet this situation various expedients have been tried. The following have succeeded:

1. The use of a cleaning aid, not necessarily a soap, which is non-exhausting in the cleaning bath and soluble through the filter.
2. The use of substantially neutral or even alkaline fatty acid soaps which may be collected on the filter with the assistance of filter-aid without an unduly rapid pressure rise.
3. The use of mildly super-fatted soaps in a batch process in which the soapy solvent is not filtered but dumped to a still feed tank after which the clothes are rinsed with distilled solvent.

Each system has its adherents. The first leaves something in the clothes not there when received; therefore the non-exhausting ingredient, if it cannot be proved beneficial, must at least be harmless. The second is claimed to be better than the first and less costly and troublesome than the third. The third is probably the best as to results, but the most costly and takes the most time.

Chemical manufacturers and dry cleaning soap compounders can hardly be accused of having been remiss in trying out new chemicals to solve this problem. Everything that might even be remotely useful has been tried together with many which had no possible merit. A clearer fundamental philosophy of the function of soap in dry cleaning in relation to modern reclamation equipment might well have developed. A broad cooperative research in the evaluation of soaps is in progress at the National Association Institute of Dyeing and Cleaning, Silver Spring, Maryland. This has been generously supported and may lead to more standardization.

Recipes for dry cleaning soaps are trade secrets, and the methods of mixing are as important as the nature of the components. One old formula was to dissolve six lbs. of stearic acid in 15 lbs. of Stoddard solvent to make solution "A." Then dissolve one lb. of potassium hydroxide in 0.5 lb. of water to make solution "B." Mix "A" and "B" and add two lbs. of well-refined, nearly odorless oleic acid. It is believed that this is generally representative of the fatty type soaps though newer products may be less acid. In every case, the dry cleaning solvent is used as diluent, and the water used to dissolve the alkali and that formed by the reaction stays in the mixture. Such soap is not very efficacious unless used in the proportion of 0.5 lb. of non-evaporable material to 25 gallons of solvent. Most commercial soaps of this type are about 50 per cent. non-evaporable material. Such soaps are made up into stock solutions, often with added alcohol to increase their "wet" action.

Soap manufacturers have kept up with other developments in this rapidly changing field, and with a considerable success have retained, if not exceeded, a high degree of potential detergency. The intelligent use of soap is an important sign of real skill on the part of a dry cleaner.

Filters

Dry cleaning solvent becomes contaminated with soluble as well as insoluble soil. The nature of both may be inferred from their origin with as much precision as is practical by analysis. The insoluble soil predominates, often accounting for over 95 per cent. of the total weight of contaminants. It is for the most part extremely fine, and while filtration was no doubt tried early in the dry cleaning art, it was impractical prior to the introduction of diatomaceous earth filter-aids, without which, the filter deposit is so impervious that practical flow-rates with filters of practical area could not be maintained for any length of time.

Accordingly, dry cleaning was forced twenty years ago to develop other methods. Those in most favor were expedited settling by caustic soda and high speed centrifuging. Both methods proved troublesome and, as means for removing insoluble soil, are now abandoned. They contributed one thing, however, of lasting value; namely, the continuous principle. As it was applied, solvent from the washer was withdrawn during the washing operation, freed from insoluble soil by caustic treatment or centrifuging and returned to the washer. This circulation was maintained until the solvent was clear. Continuous operation is today characteristic of all modern dry cleaning.

In a sense it is wasteful. A given dilution of soil can be accomplished with fewer gallons of solvent by discontinuous operation in which the washer is drained intermittently. Practically, the economies which it permits are too important to be sacrificed if adequate flow-rates can be attained. A dry cleaning washer on continuous flow needs no attention until the solvent is clear and the work has been thoroughly rinsed. With the old systems the adequacy of the continuous flow was questionable unless huge tanks or batteries of centrifuges were used.

Diatomaceous earth filter-aid completely changed the picture although dry cleaning filters were hardly of commercial significance prior to 1929. The porosity of the filter cake produced with these filter-aids leaves something to be desired. That is, the working cycle before necessity for removal of the filter cake might well be longer. However, deposits up to exhaustion as regards porosity are thick enough relative to the amount of dirt in the solvent to permit the use of filters of practically attainable area.

In modern practice the flow rate in continuous operation is at least twenty times the solvent capacity of the washer per hour and the tendency is to increase the ratio. With a washing machine adequate for 100 lbs. of work, say 35 suits, using about 100 gallons of solvent, a filter of 2000 or more gallons per hour capacity would be used. The area of the filters is computed on the basis of 30 to 35 gallons of filtrate per square foot per hour.

In use, the continuous flow through the filter is started before the clothes are added. A precoat amounting to five to six lbs. of filter-aid per 100 square feet of filter area is formed by adding filter-aid to the washer and running it to act as a mixer. After the precoat is formed the washer, but not the pump, is stopped and the clothes are added. A small additional amount of filter-aid is added and the washer started. In plain dry cleaning without soap that is all there is to it. The system is allowed to run until the solvent is clear.

Effects of Filters on Industry

The effects of filters on the industry have been great. In spite of the costliness of the liquid, the amount of rinsing attained, even in a run as short as twenty minutes, is excellent. With such brief runs small washers permit a considerable daily output. The volume of solvent has been reduced from tens of thousands of gallons to a few times the solvent capacity of the washers. Hence, the cost and size of new plants are both reduced and the output of old plants much increased. Filter-aid is a large factor in permitting dry cleaners to handle twice as many or more pounds of work per dollar as in 1928.

During the short period of their successful use, dry cleaning filters have undergone a rapid evolution mechanically. Those in use today are almost exclusively of the parallel plate type mounted in vertical cylindrical pressure tanks. The plates may be covered with cotton cloth or monel wire screen. The former are more readily renewable if the precoating fails and the fine soil gets into the mesh. However, with care this need not happen and the monel screens may be readily scraped down in place. In fact, in modern designs, this scraping may be accomplished by an external handle and involves little delay. Dry cleaning filters are built with capacities up to 8000 gallons per hour.

Adsorbents

Although insoluble dirt predominates there is always some oily matter. The latter varies in offensiveness, but it is conceded that it should never be allowed to become higher in concentration than say five grams per liter or roughly 0.044 lbs. per gallon, which of petroleum naphtha weighs about 6.5 lbs. A pound of wool cloth properly extracted in centrifugals after dry cleaning retains about 0.1 lb. of solvent. Neglecting losses in evaporation, the above maximum oil content of solvent amounts to some 0.065 per cent., which would normally seem to defy detection except perhaps by odor.

Some garments are less oily than others and the 0.1 lb. of solvent lost per pound of work cleaned requires replacement with new, oil-free solvent which tends to dilute the solvent in use. Hence, in ordinary dry cleaning the rate of increase in oil concentration is slow.

To keep it in check adsorbents of various types have been used. Of these, activated carbon is most generally preferred, but decolorizing clays have also been adopted from the petroleum industry and some percolation adsorbents are used in the synthetic solvent systems. The soft adsorbents are generally used in connection with the filter; when spent they tend to form impervious cakes; in fact, they are chemically and physically similar to insoluble soil in dry cleaning; hence, they are used in connection with filter-aid.

The basic laws of adsorption indicate that the removal of oily matter can never be complete. However, this residue is normally inoffensive as to odor. The adsorbents apparently take out preferentially the more undesirable components of the oily material present. The danger of residual odor may be further combatted by occasional treatment with caustic soda, or somewhat preferably with sodium metasilicate solutions.

These methods are reasonably adequate in smaller plants. However, they afford little flexibility in the use of soaps and prove costly and troublesome in the larger, busier establishments. In the latter and in almost all synthetic solvent systems distillation is preferred.

The synthetic solvents are readily distilled with steam heat at the pressures of 50 to 100 lbs. per square inch available in dry cleaning plants. Stoddard solvent and 140-F solvent boil between 300 and 400° F. and require reduced pressure.

Stills

The vacuum stills used with them generally resemble vacuum evaporators in design. They are provided with a calandria, considerable vapor space, an incoming solvent pre-heater, and a condenser and sub-cooler discharged by a rotary pump.

Vacuum stills for petroleum naphthas operate at about one pound per square inch absolute pressure, are fed continuously, and boil Stoddard solvent at about 225° F. The carry-over of oil is very small and distilled solvent is substantially residue free on evaporation. Odorous material volatile with the solvent is not troublesome as it will probably be volatile in the drying devices used. It may be removed with carbon or reduced with an alkaline wash.

Washers, Extractors, Drying Devices

Dry cleaning washing machines are of the horizontal cylinder type consisting of an inner reciprocally rotating cylindrical, perforated container housed in an impervious shell. They have been vastly improved in the past twenty years as to construction and methods of driving. A notable advance has been in the introduction of individual motor drives, a feat which was complicated as to Stoddard solvent by the necessity for use of explosion proof apparatus. After washing, the clothes are extracted in basket centrifuges which have been speeded up and vastly improved as to self-balancing features. More radical changes have been made in the drying devices.

Twenty years ago the built-in dry room was fairly standard. The extracted garments were hung in this and hot air was blown in. Circulation was imperfect and ventilation poor. In modern plants all work which is not particularly fragile is dried in tumblers built along the lines of washers, with a reciprocally rotated inner cylinder. The air-flow is remarkably high. Some 4000 cubic feet of air per minute are drawn through a tumbler suitable for 100 lbs. of wool clothes. The drying of clothes cleaned in the more volatile synthetic solvents is easier in one sense, but more difficult in another. The exhaust gases must be effectively treated to recover the solvent if costs of operation are not to be excessive. No effort is made to recover the fumes of Stoddard solvent because of its low cost.

Delicate articles are hung up in compact drying cabinets which are operated on much the same principles as tumblers except that the articles are not tumbled.

Spot Removal

Soiled garments contain not only general soil, but also spots and stains. Many of these yield readily to water brushing. Others require the use of solvents, lubricants, enzymes, acids, alkalies, or reducing agents. A successful spotter must have a broad knowledge of practical textile chemistry.

The pre-spotting formula recommended by the National Association Institute of Dyeing and Cleaning is as follows:

1. Mix together
   3 pints oleic acid
   1 quart carbon tetrachloride
   1 quart hexalin
2. Add slowly, stirring well
   ½ pint, 28% ammonia
3. Then add slowly, stirring well
   1½ pints water

This gives a clear brown solution. It is used on garments previously wetted with solvent, and is rinsed out of the stained area with solvent before the garment is cleaned.

Because of the necessity for using water in spotting, dyes not reasonably fast to water complicate the problems unduly. Accordingly, a dry cleanable fabric is not entirely practical unless also wet cleanable with due precautions. Neglect of this fact on the part of textile manufacturers has proved costly to them, to dry cleaners, and to the general public.

Where all else fails garments may be cleaned by hand washing in neutral soap and water at low temperatures with much effort to avoid shrinkage, distortion, and loss of color. Wet cleaning of dry cleanable apparel is costly, particularly to press the articles satisfactorily. Therefore, it will not be employed unless necessary.

Progress in auxiliary treatments after dry cleaning proper has been considerable. New industrial chemicals as they have appeared have been promptly investigated for this purpose. The literature of textile chemistry is constantly watched for new ideas. Means have been discovered for spotting acetate rayon which is made difficult by the fact that the fiber itself is soluble in various liquids which are safe for other materials. The National Association Institute of Dyeing and Cleaning has turned out over 1500 alumni from its school; these have received a practical training in the science and art involved, and their influence has been increasing.

Chemical Research

The spirit of research has been alive within the industry. The National Association has never been without a trained chemist with competent assistants at its headquarters since 1926; many books, bulletins, and news releases have been produced. Annual conventions of the national and state associations are well attended and the programs usually include considerable technical matter. Funds were collected and expended to support basic investigations at the National Bureau of Standards between 1926 and 1932. Not only methods but effects on wool, silk, rayon, etc., have been studied. Much of

this work has been of vast public value in encouraging improvement of the quality of new textiles. Fellowships related to dry cleaning have been active at Mellon Institute continuously since 1921. Chemical makers and machinery manufacturers sponsor private chemical research.

It is appropriate to note some social effects of the growth of this chemical industry of dry cleaning. It supports a considerable number of persons directly in the plants, or indirectly in the solvent, machinery, and other allied trades. More important is its great effect in raising the general standard of living. The United States, where dry cleaning flourishes to greatest extent, is the best dressed nation of the world. It might be argued that dry cleaning is prosperous on that account; on the other hand our vast clothing factories and textile mills would have to produce quite different products if dry cleaning were not organized as it is. Dry cleaning is most certainly a chemical industry which has grown up, as it were, in the last twenty years.

Lime Figures for '37

U. S. shipments (sales) of lime in '37, according to preliminary figures furnished the Bureau of Mines by producers, comprising about 80 per cent. of the industry, increased approximately 4 per cent., compared with '36, when an increase of 26 per cent. over the previous year was recorded. Total sales indicated amounted to 3,882,000 short tons valued at $28,375,000.

Following the general trend of most manufacturing industries in '37, demand for lime ran well ahead of the previous year during the first several months, slowed down after midyear, and was very poor during the last quarter. The decline in the latter half year virtually cancelled the gains during the first half. Business was spotty, some companies reporting much better sales while others selling to the same industry and even in the same territory were unable to ship as much as they did in '36.

Lime for agricultural use (392,000 tons valued at $2,586,000) was the only class that showed a substantial increase (16 per cent.) in total sales, although even in this field, many companies reported decreases in output. Notwithstanding an increase of about 10 per cent. in building construction, the quantity of lime reported sold for construction (898,000 tons valued at $7,837,000) increased only one per cent. So-called "chemical" lime (exclusive of dead-burned dolomite)—used in chemical, metallurgical, and other process industries—amounted to 1,984,000 tons valued at $12,762,000, the increase of only 3 per cent. in tonnage being somewhat disappointing in view of the high rate of activity in iron and steel, paper, and a few other lines during a large part of the year. Dead-burned dolomite shipments (608,000 tons valued at $5,190,000) increased only 2 per cent.

Prices throughout the country were slightly higher than in '36. Average value reported for '37 was $7.31 compared with $7.18 in '36.

Hydrated lime included in the total output amounted to 1,237,000 tons valued at $10,205,000, an increase of about one per cent. in quantity and 7 per cent. in value. About one-half of the hydrated lime is used by the building trades, one third for chemicals, and the remainder for agriculture.

Ohio and Pennsylvania, respectively, are the leading States in lime production, and both these States registered gains substantially higher than the national averages but for different causes. Ohio showed a small decrease in building and strictly chemical lime, a small increase in agricultural lime, and a considerable increase in dead-burned dolomite. Pennsylvania showed an increase in building and agricultural lime and a decrease in chemical lime and dead-burned dolomite.

Names of the Month—

A Current Supplement to the Chemical Who's Who

DAVIS, Alex Brooking, pres., Hilton-Davis Chem. Co.; b- Macomb, Ill., 16 Sept. 1882; mar. 1. Sarah Mary Johnstone, Chgo., 22 Aug. 1906; 2. Eva L. Franz, Cin'cti., 25 Apr. 1936, 2 daus.; educat. Ala. Polytech. Inst., post grad. wk., 1906-07. Semet Solvay Co., chem. 1900-06; Indiana Gas Assn., chem. 1907-11; Eli Lilly, Dept. Exper. Medicine, res. chem. 1911-15; Ault & Wiborg Co., chem. dir., 1916-20; Cin'cti. Chem. Wks., asst. gen. mgr. 1920-22; Hilton-Davis Chem. Co., pres. 1923 to date. Holder 45 patents covering var. pharmaceutical prods., paper sizings, synth. chems., and chem. procs. detail. Memb. A.C.S. Clubs: Cin'cti. Country. Address: Langdon Farm Road & Penn. R.R., Cin'cti., O.

KNAPP, Ismond E., chf. chem., Crosby Naval Stores Co.; b- Lodi, N.Y., 21 Sept. 1893; mar. Ruth M. Brace, Richmond Hill, N.Y., 30 Nov. 1916, 1 son, 2 daus.; educat. Cornell, B. Chem. 1915. DuPont Co., Dyestuffs Div., plant supv., res. chem. 1918-25; Acme Prods. Co., chf. chem. 1925-29; Newport Industries, Inc., asst. chf. chem. 1929-37. Memb. A.C.S.; Sigma Xi; Alpha Chi Sigma; F. & A. M. Club: Rotary. Hobbies: gardening, bridge, ping pong. Address: Picayune, Miss.

POTH, Edgar Jacob, chf. surgeon, Bahrain Petroleum Co., Persian Gulf; b- Seguin, Tex., 1 Feb. 1899; mar. Gaynelle Robertson, Baltimore, 22 Dec. 1928; educat. Texas Univ., A.B. 1922, M.A. 1923; Calif. Univ., Ph.D. 1925; Johns Hopkins, M.D. 1931. Calif. Univ., instr. chem. 1925-26; Johns Hopkins, instr. pharm. 1927-30; Natl. Res. Fellow (Medicine) 1932-34; Stanford Univ. Med. Schl. 1934-36; Bahrain Petroleum Co., Persian Gulf, chf. surgeon 1936 to date: Stanford Univ. Schl. of Medicine, instr. surgery, 1936 to date. Res. on catalytic reduction, semi carbizones, nitrogen compounds in petrol., organic analysis. Memb. Phi Beta Kappa, Sigma Xi, A.C.S., A.M.A. Hobbies: photography, hunting, fishing, golf. Address: Stanford Univ. Hospital, San Francisco, Calif.

SCHNEIDERHAN, Felix J., plant pathologist and entomologist, Chipman Chem. Co.; b- Jordan, Minn., 20 Nov. 1892; mar. Myrtle Jackson, Harrisburg, Pa., 21 Dec. 1929; educat. Univ. Minn., B.S. 1914, M.S. 1915; W. Va. Univ., Ph.D. 1933. Forest Lake, Minn. High Schl., agric. dir. 1915-16; U.S. Dept. Agr. scientific asst. 1916-17; Churn Co., asst. mgr. 1920-22; Va. Agr. Exper. Sta., assoc. plant pathol. 1922-29; W. Va. Agr. Exper. Sta., assoc. plant pathol. 1929-37; Chipman Chem. Co., plant pathol. and entomologist 1937. C.W.S., U.S.A., Master Engr. Jr. Grade 1917-19. Edit., co-author "The History of the Amer. Chem. Warfare Service," 55 vols., Archives of War Dept.; author num. scientific pubs. Res. on fungicides in relation to spray injury and for control of fruit diseases; devel. method of preparing "Instant Bordeaux" from chem. hydrated lime and pulverized copper sulphate. Memb., A.A.A.S.; Amer. Phytopathological Soc.; Entomological Soc. of Amer.; Amer. Legion. Clubs: Rotary, Opequon Country. Hobbies: hunting, fishing, raising pedigreed Scottish Terriers, collecting and refinishing antique furniture. Address: The Chipman Chem. Co., Bound Brook, N.J.

SIEGEL, Louis, res. engr., Research Foundation of Armour Inst.; b- N.Y.C., 11 Jan. 1915: educat. Armour Inst., B.S. 1936. Armour Inst., res. engr. 1936 to date. Washability surveys on mines of the Peabody Coal Co., Ill. Memb. Phi Lambda Upsilon; A.I.Ch.E.; Rho Delta Rho. Hobbies: swimming, basketball. Address: 35 W. 33rd St., Chgo., Ill.

Welding in Chemical Plants

By W. D. Wilkinson, Jr.

Electro-Metallurgical Co.

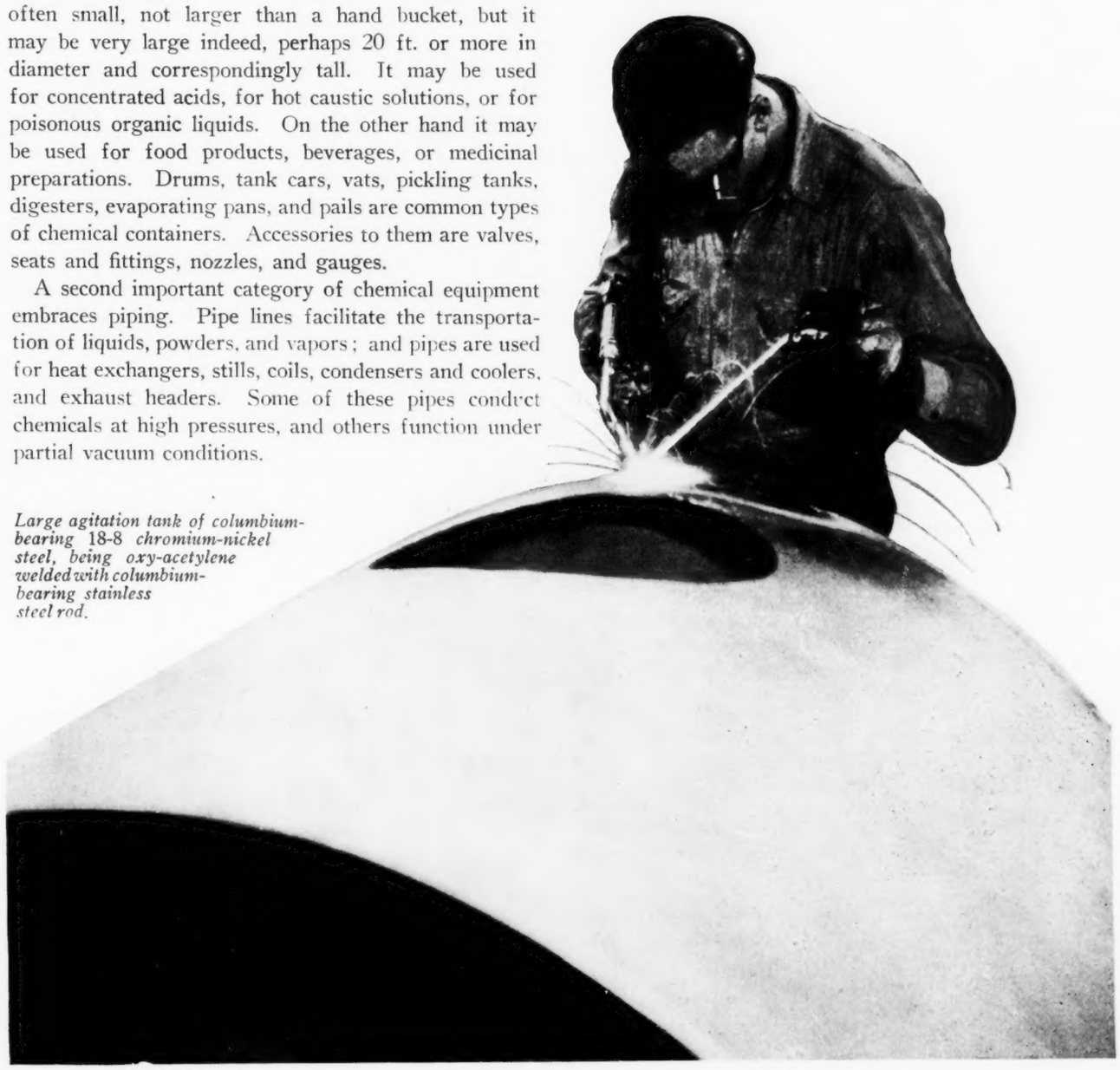
FABRICATION of chemical equipment requires consideration of both materials and techniques if sound, inexpensive, and efficiently operating equipment is to result. Take the container as an example. It is used in the manufacture, the storage, and the transportation of chemical materials. It is often small, not larger than a hand bucket, but it may be very large indeed, perhaps 20 ft. or more in diameter and correspondingly tall. It may be used for concentrated acids, for hot caustic solutions, or for poisonous organic liquids. On the other hand it may be used for food products, beverages, or medicinal preparations. Drums, tank cars, vats, pickling tanks, digesters, evaporating pans, and pails are common types of chemical containers. Accessories to them are valves, seats and fittings, nozzles, and gauges.

A second important category of chemical equipment embraces piping. Pipe lines facilitate the transportation of liquids, powders, and vapors; and pipes are used for heat exchangers, stills, coils, condensers and coolers, and exhaust headers. Some of these pipes conduct chemicals at high pressures, and others function under partial vacuum conditions.

A third group of chemical equipment is mechanical, such as filter screens, agitator blades or arms, centrifuges, and pumps, including rods, blades, shafts, and casings.

In considering the requirements of plant equipment from the safety standpoint, strength of construction is obviously as necessary as it is from the standpoint of efficiency. A tank car for nitric acid should be so fabricated that it presents no doubt as to its safety and serviceability. If the spout or nozzle of a sulfuric acid pail should break during pouring, the result might be serious. Piping should resist any stresses to which it may possibly be subjected. It is also necessary that mechanical equipment be perfectly sound. There should be no opportunity for a centrifuge to fly loose or for any fixed or moving piece to break and cause damage.

Chemical piping and containers must be leakproof. Concentrated acids or caustics cannot be permitted to drip or spurt from faulty mechanical valves and joints.



Large agitation tank of columbium-bearing 18-8 chromium-nickel steel, being oxy-acetylene welded with columbium-bearing stainless steel rod.

The cumulative effect of poisonous fumes escaping continually through minute leaks must be eliminated. The passage of dust or powder into the air must also be prevented.

If equipment is to remain strong and leakproof it should be highly resistant to corrosion. Acids, caustics, and the solutions of various salts and organic compounds either corrode or aid in the corrosion of various metals. The corroded part becomes weak and possibly embrittled.

Corrosion can cause other difficulties, such as would result, for example, if an important control gauge or automatic valve should become corroded so that it did not function.

One other requirement is necessary for equipment especially if used in food factories and breweries. All containers should be easy to clean and sterilize.

Stainless Steels

Corrosion resistant metals that are easily cleaned are available commercially. Such metals are the high chromium steels commonly known as "stainless steels." Moreover, strength of construction and tight, leakproof joints are readily obtained by oxy-acetylene or electric welding. The four requirements of chemical equipment: strength, tight joints, corrosion resistance, and ease of cleaning, are therefore available through the use of welded stainless steel.

Corrosion is met by practically all manufacturers of heavy chemicals. The remedy for chemical corrosion, as well as electrolytic corrosion, usually lies in the choice of materials and in the method of fabrication.

Both types of corrosion in chemical equipment are minimum for a given material when all of the joints and seams are homogeneous and as free as possible from strain. Variations in thickness of the joints, the strain set up by the threading of pipe or by punching out holes for mechanical unions, and the juxtaposition of dissimilar metals, all tend to accelerate corrosion. The fact that a joint properly fusion welded by the oxy-acetylene process eliminates these disadvantages makes oxy-acetylene welding an ideal method of fabrication. The oxy-acetylene welded seam is especially smooth, may be made constant in thickness, homogeneous, and unlike riveting, does not require any punching of holes or cutting away of metal. The suitability of oxy-acetylene welding for welds in general can be verified by testing a properly made joint in nitric acid. A good weld in carbon steel will be eaten away as uniformly as the adjoining metal. For welds in stainless steel, which would not be attacked at all by the nitric acid, aqua regia or some equally active etching medium must be resorted to for the test.

The use of chromium steel for nitric acid was first introduced about ten years ago. Considerable experimentation and experience lead to the conclusion that some type of chromium steel is best suited to give satisfactory results in a given case with nitric acid. The exact type of alloy, however, depends upon the actual conditions of use. This is especially true when the nitric acid is not pure but is mixed with other acids, such as hydrofluoric or sulfuric.

When small amounts of nitric acid are accompanied by fairly concentrated sulfuric acid, either the 28 per cent. chromium iron or the 18-8 chrome-nickel steel is suitable for such equipment as nitrators, piping, and pumps.

Under ordinary operating conditions in the average plant, either the 15-30 per cent. chromium steel or the 18-8 alloy will be found suitable for piping, pumps, and storage containers. This is true for nitric acid from nitrate as well as that produced by the catalytic oxidation of ammonia. Indeed, one well-known chemical corporation uses packing towers of stainless steel 30 ft. or more in height. These towers are constructed entirely by welding. The 28 per cent. chromium steel is also frequently used for towers such as these. For high temperature work the 18 per cent. chromium iron was formerly used in preference to the 18-8 alloy. When used for air preheaters, for example, the chromium iron was thought to be more stable. Recently, however, the introduction of alloys treated or stabilized with columbium or titanium has done much to augment the stability of the 18-8 steel.

This same type of stainless steel is suitable for use with many other acids. It is used in the piping and pumps for nitrous acid as well as for contact and fuming sulfuric acid. For digesters and other apparatus handling warm sulfuric acid, the 18-8-3 chromium, nickel molybdenum alloy is often used. This also resists the attacks of any concentration of cold phosphoric acid up to 50 per cent. The oxy-acetylene flame is particularly recommended for the welding of this type of alloy.

In the treatment of phosphate rock in the presence of sulfuric acid at high temperatures, it is the presence of fluorine-containing impurities which is largely responsible for the need of corrosion-resistant alloys. The latter are used on mechanical agitators, the pumps, and other metal equipment exposed to the corrosive action involved in the treatment of phosphate ore. An illustration is the practically complete immunity of welded columbium-treated stainless steel, even under the severest conditions of cross welding, to the action of the fluorine ions. The use of these alloys in tube mills should not be overlooked. Welding, of course, is playing an important role in these installations and will play an even more important role in coming years; for advancements in the art of welding these metals, including the use of the columbium-treated 18-8 rod, have been developed to meet long-felt needs.

The 18-8 alloys are widely used in the handling of alkalies as well as for many salt solutions. For the valve parts in contact with molten caustic and for the evaporators, piping, and pumps used for aqueous potas-

sium hydroxide solutions, the stainless steels are of undoubted value. They are also used for the pumps, piping, or containers of such salts as sodium cyanide, carbonate, sulfate, bisulfate and thiosulfate; barium, calcium, magnesium and ammonium chlorides; copper and zinc nitrates; ammonium bromide (20 per cent. solution), phosphate and sulfate; aluminum sulfate less than 10 per cent. concentrated; and bleach liquor such as slightly alkaline calcium hypochlorite. Boric acid piping is generally of either the 18-8 alloy or the 14 per cent. chromium steel. Silicon-iron alloys are sometimes used for boric acid pumps, but the chromium and nickel steels are recommended if the purest products are to be obtained. With the newer treated 18-8 steels and the recently developed columbium-treated welding rod, oxy-acetylene fabrication of equipment of these alloys greatly increases the opportunities for use of this type of equipment. It is resistant to copper sulfate solution, maintaining its ductility and freedom from intergranular corrosion at the welded seams as well as elsewhere.

For many pressure applications the 18-8 alloy finds further application. Hydrogen sulfide, carbon monoxide, ammonia, and sulfur dioxide are some of the gases conveyed through chromium steel piping.

Sulfur dioxide and sulfurous acid are important in sulfite pulp mills. Oxwelded stainless steel piping is used to convey the hot sulfite liquors and vapors. This piping is often 4 to 10 in. in diameter. Considerable success has been had with welded digester linings. The columbium-treated steels and rods are expected to have many possibilities in this connection. The stainless steels used for the piping and linings are either the 22-12 chrome-nickel alloy, the 18-8 alloy, or the 18-8-3 alloy, which is the same as the preceding except that it contains 3 per cent. molybdenum. The 18-8 alloy should preferably contain columbium or titanium to inhibit intergranular corrosion.

Chromium steel tubing used in oil refineries generally affords better satisfaction at high temperatures than does carbon steel. Where thermal efficiency is a factor, the thin walls made possible because of the greater strength of the alloy more than offset its lower heat conductivity. It also better resists external oxidation and internal corrosion due to the crude oil. The joint strength of oxy-acetylene welded installations makes possible further savings in the thickness of the walls and increases safety. Valves, nozzles, flanges, and pressure vessels of welded chrome steel are also used in the petroleum industry. It is recommended always that the welded seams of pressure vessels be tested with X-rays. New apparatus for this purpose has recently been placed on the market.

The dye industry makes much use of oxwelded stainless steel for vats and dye buckets. As various strong acids, including nitric acid, are used with the organic dyes, it is essential that even such apparently unimportant things as the pouring spouts of the buckets be leakproof and resistant to corrosion.

Organic chemicals for use in the dye and other industries require chromium steel piping, pumps, and distilling systems. Alcohols, ethers, amines, phenols, aldehydes, and the higher fatty acids and various other organic acids, while ordinarily corrosive, do not affect the 18-8 steel. Acetic acid in concentrations above 56 per cent. requires stainless steel of the type known as 18-8 S Mo for most satisfactory service. Directions are given in a later section for oxwelding these high chromium steels.

Stainless steels and irons may be classified into a number of groups according to certain welding considerations. The first group contains 12 to 15 per cent. chromium and about 0.30 per cent. carbon. The stainless steels of this class are rarely used in chemical plant equipment, finding application mostly for cutlery and heat-treated machine parts.

The second group, which has less carbon, is usually more satisfactory for the types of equipment discussed in this article. From 11.2-15 per cent. chromium is best and a maximum of 0.2 per cent. carbon. This metal is used chiefly in sheet form. When welded it must be subsequently heat-treated when full strength is to be developed. Annealed best in a furnace at 1,250 to 1,300 deg. F., this material can also be blowpipe annealed for 3 min. at these temperatures. If conditions are such that a bronze-welded joint will satisfy the corrosion conditions, this application takes place at a sufficiently low temperature so that no after-annealing is necessary or advisable.

The next group includes another type of stainless iron. Containing 15-18 per cent. chromium and a maximum of 0.10 per cent. carbon, this alloy also contains 0.50-1.25 per cent. silicon and not more than 0.50 per cent. manganese. Either welding rod of the same composition as the base metal, or a rod containing 18 per cent. chromium and 8 per cent. nickel gives excellent welding results. While the presence of silicon and manganese facilitates welding and resistance to corrosion and oxidation at all temperatures up to 1,500 deg. F., there is sometimes a tendency to grain growth, in the vicinity of the weld which, however, can be controlled by welding carefully. If it is desirable to improve the ductility in this area, annealing may be carried out.

Another group is a 24-30 per cent. chromium iron containing 0.50-1.00 per cent. manganese, and maximum of 0.60 per cent. silicon and 0.30 per cent. carbon. The welded chromium iron, while not very resistant to severe mechanical treatment at ordinary temperatures, is ductile at temperatures above 932 deg. F. The welded joints will give excellent service wherever a metal is needed that is strong and resistant to oxidation at high temperatures. This metal has about the same coefficient of expansion as steel, and corresponding allowances should be made for expansion and contraction in welding. Rods of similar composition and, as always with chromium irons and steels, Cromaloy flux are used.

When castings of this chrome iron are welded, they are preferably preheated before welding and annealed afterwards. On account of its high carbon content the use of an excess acetylene flame is permissible.

A type of stainless steel used to resist oxidation at high temperatures is the 24 per cent. chromium-12 per cent. nickel alloy. Metals in this group contain 20-30 per cent. chromium, 10-22 per cent. nickel, 0.5-1.5 per cent. silicon, and a maximum of 0.25 per cent. carbon. Because of the high coefficient of expansion and low conductivity, the backhand method of welding, which retards contraction, is preferred. Generous applications of Cromaloy flux, especially on the bottom of the edges to be welded, will tend to counteract the sluggish qualities of the slag. Grain growth in this alloy cannot be removed by annealing.

Evidently chromium is the most important of the alloying metals used in making corrosion and oxidation resisting alloy steels. A stainless steel containing approximately 18 per cent. chromium and 8 per cent. nickel is very commonly used. The carbon in this, as in all stainless steels, does not impair the corrosion-resistant qualities as long as it is in solid solution; but between the temperatures of approximately 930-1,650 deg. F., carbide will gradually precipitate out along the grain boundaries of the untreated metal, making it susceptible to intergranular corrosion unless subsequently heat-treated. The further the carbon content is reduced below 0.10 per cent., the greater will be the resistance to intergranular corrosion, until at about 0.04 per cent. the alloy can be welded and used in the as-welded condition with practically complete freedom from intergranular corrosion. Susceptibility to intergranular corrosion is also practically completely eliminated in the treated or stabilized 18-8 steels containing either columbium or titanium. The ratio of the amounts of these elements to carbon content is important.

A welding flame with a large excess of acetylene (which has a carburizing action) should therefore be avoided. Carbon from the excess acetylene flame would make the seam not only susceptible to corrosion, but brittle as well. On the other hand, an oxidizing flame is also to be avoided. It converts the chromium to infusible oxide that interferes with the soundness of the weld. A neutral flame, or one with the slightest possible oxidizing tendency, is recommended. The proper flame adjustment is very easily learned.

Cromaloy flux is recommended for the oxwelding of this, as well as for any other type stainless steel or iron. This flux dissolves the refractory chromium oxide that is formed during the welding, and at the same time protects the molten metal against further oxidation. All parts of a seam, including the underside, should be painted with a water paste of Cromaloy flux. Usually a thin coating of flux is also applied to the rod.

It is advisable to use the minimum heat requisite for the job and to weld as rapidly as is compatible with good workmanship. Work carried out by this method is more easily kept in alignment, and the possibility of overheating is minimized.

In welding untreated or straight 18-8, if the material is thin enough to permit backhand welding and air cooling through the zone of carbide precipitation temperatures, no after treatment will be necessary to prevent intergranular corrosion. Under less favorable conditions, it is necessary to heat-treat at about 1,800-1,900 deg. F. after welding and then water-quench to bring the corrosion-resisting properties once more to a maximum. Now, however, research has developed stainless steels which have practically no susceptibility to intergranular corrosion and which consequently have corrosion-resistance in the as-welded condition.

These new types of 18-8 contain either columbium or titanium. In the case of columbium-treated 18-8, this element should be present to a sufficient amount so that the columbium-carbon ratio in the weld metal varies from 5-1 to 10-1, according to the carbon content of the stainless steel being welded and the temperature at which it is to be used. For use in the welding rod, the element columbium is stated to have the advantage over titanium that it is not burned out of a rod of proper analysis to any appreciable extent during welding.

Procedure control to promote sound and permanent welds is as important in the fabrication of stainless steel as it is in the oxwelding of ordinary carbon steel. Introduced as such in 1924, procedure control was developed after research and analysis of the factors that contribute to differences in the satisfaction afforded by welding on similar or identical projects. It minimizes the human factor of the individual who operates the welding equipment, and places the responsibility for successful work squarely upon the management. That it is the means of obtaining successful and uniform results, its application has proved time and again in actual practice.

A procedure control for any type of oxwelding application is a master guide from which detailed specifications for any particular job can be prepared covering the following six factors:

(a) Check of the welding operators—to see that only competent operators are used. Further, that they prove their ability by successfully passing qualification tests, preferably tests simulating the particular operation involved.

(b) Selection and inspection of material—to make certain that only material suitable for welding is used and that proper welding rod is selected.

(c) Design and layout of welded joint—to insure that the joint is correctly designed for welding.

(d) Preparation for welding—to see that preparation and assembly are best for welding.

(e) Organization and welding technique—to see that the welding is carried on in the most satisfactory and economical manner and that the welding is correctly done.

(f) Inspection and Tests—to test whether the above items of the welding procedure have been followed and to see that proper welding results. The test of the completed work is an additional assurance that the welding installation will give satisfactory service.

New Plants, Products and Processes in the British Chemical Industry

By T. W. Jones. B.Sc.

Editor, "The Industrial Chemist"

CHEMICAL manufacture in the United Kingdom has continued the upward trend significant of recent years. Not only has the production of existing factories been increased to meet the demands of re-armament, but also those of the upward prosperous swing of industry in general. The building of new factories, and the extension and modernization of existing plants, have, if anything, accelerated, and capital expenditure in this direction will be found, when the figures are finally worked out, to have been on a scale unapproached in the past, except possibly during the war years.

Export markets and the entrepôt-trade have also increased their demands, in fact, the export trade in chemicals is higher than it has ever been, except for the peak of 1929. Imports of chemicals also show an increase, but are not as high as they have been in the past. The exports of chemicals have increased by 19 per cent., during the first 11 months of 1937, as compared with the first 11 months of 1936. Imports show little more than half this rise in the same period. These increases differ from those of the total foreign trade of the country, the export increase being greater, and the import less.

Those who of recent years have queried the value of sulfuric acid production as an indicator of industrial activity may have to revise their new found opinion. The Association of British Chemical Manufacturers, early in the year, published an interesting comparison of the consumption of the acid by leading industries in Great Britain and Northern Ireland in 1935-36. In that year the manufacture of superphosphate consumed 222,104 tons; sulfate of ammonia 193,864 tons; metal pickling (including tinplate) 87,319 tons; dyestuffs 43,910 tons, and textiles (excluding artificial silk) 25,337 tons. According to the National Sulfuric Acid Association, the production of sulfuric acid reckoned as 70 per cent. H_2SO_4 in the United Kingdom and the Irish Free State has been as follows:

	1937		
	Chamber Tons	Contact Tons	Total Tons
1st quarter	294,500	115,600	410,100
2nd "	280,700	115,500	396,200
3rd "	235,800	117,600	353,400
4th "	.....	.....	.....

These figures compare with the two previous years as follows:

	1935		
	Chamber Tons	Contact Tons	Total Tons
1st quarter	271,600	86,900	358,500
2nd "	244,100	87,700	331,800
3rd "	200,800	78,000	278,800
4th "	271,100	100,400	371,500

	1936		
	Chamber Tons	Contact Tons	Total Tons
1st quarter	283,000	104,700	387,700
2nd "	260,800	108,900	369,700
3rd "	224,800	110,800	335,600
4th "	284,700	116,100	400,800

These figures show that contact processes continue to supply an increasing quantity of acid, although it is obvious that capacity in chamber plants has been utilized more fully.

Particularly noticeable has been the increase in by-products recovery plants installed in connection with coke ovens, the capacity of which has been increased considerably to deal with the iron and steel demand. Pig iron production for the first 11 months was 7,712,800 tons, a record for the United Kingdom. In addition, low temperature carbonization continues to expand, and the foundation of yet another factory was laid during December in South Wales.

Calcium Carbide

In March a debate in the House of Commons upon the Caledonian Water Power Bill led to its rejection. During the debate it was stated that the annual requirements of this country are 60,000 tons. This round figure is approximately correct, but importation has steadily increased, the quantities imported during the first 11 months of each of the last three years being 996,903 cwt. in 1935; 1,011,304 cwt. in 1936, and 1,153,730 in 1937, and the values £547,963 in 1935; £561,153 in 1936, and £624,781 in 1937, Norway supplying approximately 60 per cent. A week later the Defence Minister announced that a small committee was to be set up to consider the question of calcium carbide supplies. This was formed under the chairmanship of Sir Ernest Harvey, a late Deputy Governor of the Bank of England, and Messrs. Peter Bennett and T. Lodge, Sir Gilbert Morgan, F.R.S., Director of the Chemical Laboratory, Teddington, being appointed Technical Assessor to the committee. The committee recommended in November that a scheme put forward by the British Oxygen Co.,

Ltd., should be followed. This will entail the construction of two factories, one at Port Talbot in South Wales, and the other at Corpach in the West Highlands. The erection of the former would not appear to involve any special legal difficulties, but the erection of the Highland factory will necessitate reintroduction of the Caledonian Water Power Bill. The Welsh factory is estimated to cost one million pounds, and the Corpach, three million pounds.

The past year has witnessed the introduction of a number of chemicals of British manufacture. Monsanto have introduced sodium benzoate, and esters of phthalic acid, thus following up their introduction last year of the acid, and, in addition, they have put on the market standardized cresol-xylenol mixtures. A. Boake, Roberts & Co., Ltd., have introduced new metallic naphthenates, and zinc stearate of British manufacture is now available. The same firm introduced early in the year a new sweetpea base for perfumery. Synthetic camphor, which has been available in small quantities in the past, is now on the market on a commercial scale, Howards & Sons, Ltd., being responsible. It is also being manufactured by the British Xylonite Co., Ltd. Oxalic acid of British manufacture became available on the commercial scale. We noted the initial stages in this article last year. *D*-Sorbitol has been put on the market by Howards & Sons, Ltd., in foodstuff and commercial qualities, the same firm being responsible for the introduction of Nilox Ester Oil S. Among medicinal preparations note should be taken of amyl salicylate, concerning which cooperative investigation between industry and medicine has resulted in the introduction of a most valuable substance for the treatment of acid and heat burns. Originating with work at the factory of Spencer, Chapman & Messel, Ltd., A. Boake, Roberts & Co., Ltd., have jointly worked with the Medical Research Council, and the results were published early in the year in the *British Medical Journal*. The preparation incorporates amyl salicylate and a mixture of isomeric methyl, tertiary butyl phenols.

Among inorganic newcomers may be mentioned Burgess zeolite, made at a new factory at Hinckley, finance being available from the Burgess Zeolite Co., Ltd., specially formed for the purpose during the past year. Potassium permanganate of British manufacture has been introduced, and also crystalline soda. Strontium salts have been put on the market by Messrs. Albright & Wilson, Ltd. Metallic magnesium is being made by the electrolysis of the fused chloride—a large factory has been built in Lancashire and another is projected for South Wales.

In relation to textiles, the most important introduction has obviously been Velan PF, sponsored by I. C. I., Ltd. This is a water repellent and is said to combine with certain reactive groups in the textile fibre itself, giving new compounds which are highly water repellent and of great stability. Cotton, silk, wool, viscose, linen and cellulose acetate, and other common materials, can be treated without any interference with their textile properties. The Bleachers Association is now producing "Bleapel-Velan" finished fabrics. Cyclohexylamine by Howards & Sons, Ltd., is said to be a powerful dye solvent, and is being marketed to the printing and dyeing sections of the textile trade. Among dyestuffs mention may be made of additions by I. C. I., Ltd., to the Monastral range introduced in Monastral Fast Blue last year. Williams (Hounslow) Ltd. have introduced a Dermatol range of dyes for leather, and L. B. Holliday & Co., two vat dyes.

Perspex was probably the most interesting of the plastics introduced. This is a transparent material that can be molded into lens form at a considerable reduction in weight compared with glass. This was introduced to the technical public by Combined Optical Industries, Ltd., last March. The industrial applications of Neoprene were demonstrated by I. C. I., Ltd., at an exhibition in London in April. Chlorinated rubber developments were reviewed in a paper before the Plastics Section of the Society of Chemical Industry at the end of the year, and a great deal of the information available to I. C. I., Ltd., was published. Rubtex, known on the Continental market under the name of "Guttaterna," has been made available in its various forms to the English market. Messrs. A. Boake, Roberts & Co., Ltd., have been responsible for the introduction of a long list of citrates and tartrates which are finding increasing favor as plasticizers.

Although last year's accounts published by chemical firms during the early part of the year showed a welcome buoyancy of profits, those of companies reported for periods covering sections of 1937 have shown even greater recovery from the economic depression. Taking a few at random, the accounts published early this year covering 1936 must include the Imperial Chemical Industries, Ltd., record profit of £7,203,000 after one million pounds had been placed to central obsolescence and £638,000 to income tax reserve. The comparative figure for 1935 was £6,700,000. Other considerable increases were Joseph Crosfield & Sons, Ltd., with a profit of over £800,000; Monsanto Chemicals, Ltd., with over £100,000, and other companies such as Bradford Dyers' Association, Gas Light and Coke Co., Ltd., British Oxygen Co., Ltd., W. J. Bush & Co., Ltd., and Beecham's Pills, Ltd. (whose net profit was over £500,000). Maclean's Limited with accounts covering a period up to June 30th were a little over £260,000; the Imperial Smelting Corporation for the same period showed a net profit of £257,000; British Industrial Plastics' report to September 30th showed £105,000.

The most important legislation affecting the chemical industry was undoubtedly the Factories Act which, only introduced into the House of Commons on January 29th, received the Royal Assent on July 30th. This rapidity in legislation utterly belies the importance and the volume of the Act. The Act probes into every section of industry and deals particularly faithfully by chemical and allied industries, and runs to no less than 160 sections, and 139 pages of text.

Corrosion—

Cause in Pumps

By C. H. S. Tupholme

CORROSION may be due to many different causes: it generally arises from chemical or electrolytic action or from combined chemical and mechanical action; in addition to that, the material may be worn away by purely mechanical action, especially when the fluid contains sand or similar gritty matter.

The cause of corrosion in a centrifugal pump is often impossible to determine exactly. Likewise in hydraulic turbines corrosion is evident at the extremities of runner blades and at the tips of guide wheels, while the casing and covers are generally less affected. The spots eaten away by this type of corrosion become spongy and destruction often proceeds at such a rate that a short period of service renders the corroded part useless.

Chemical corrosion is found particularly in acid pumps when unsuitable material has been employed in their construction. For instance, a shaft of Monel-metal was improperly used in a pump handling sulfuric acid with a specific gravity of 1.06. After two months the shaft was so corroded that it broke. Casing and impeller were made of a bronze free from zinc and proved to be resistant. In other cases shafts made of stainless steel (chrome steel) lasted only about three months.

Mechanical action rather than chemical action corroded cast-steel guide wheels in an 1800 H. P. high-lift centrifugal pump. To facilitate the machining of the guide wheel passages, the wheels were made in two parts. Under the high pressure at which the pumps worked, water was forced into the joint between the two sections and into the over-flow passages, thereby wearing through the joints. As the water contained traces of carbonic acid, mechanical destruction was accelerated somewhat by chemical action. The trouble was removed by making the guide wheels in one piece and of bronze.

Most corrosion cases are due to combined chemical and mechanical action on the material. Such cases occur when water pumped contains a considerable quantity of air or other gases. Small air bubbles adhere firmly to the material, and the oxygen contained in them combines with the metal; the water flowing over washes out the oxide, so providing still more favorable points for corrosion. If the material is impure or non-homogeneous, the action, of course, proceeds more rapidly; some metals, a good bronze for example, oxidize much less readily than iron.

One factor which favors corrosion is a high suction head; the greater the vacuum generated, the more air is freed from the water, and if there is also carbonic acid present, rapid destruction of the metal is unavoidable. If the water is flowing at a high speed, this also accelerates corrosion. Hence the greatest corrosion is at the extremities of the impeller blades and at the tips of the guide wheels. Also eddy currents, produced where the water passes from the impeller into the guide wheel, increase the danger of corrosion. In multi-stage pumps only the first impeller (suction-side) commonly is attacked, while those in the following stages remain practically unaffected. An explanation can only be that there is a certain vacuum at the inlet to the first impeller and that this causes air to separate out from the water, while the other impellers work under a certain pressure so that no air is separated out from the water they handle. Corrosion of this kind is not as a rule found in pumps to which water flows under pressure.

A typical example is afforded by a bronze guide wheel from the first of a five-stage high-lift centrifugal after delivering drinking water continuously 15,200 hours. The impeller of this stage was corroded in a similar manner at the extremities of the blades, while there was not the slightest trace of corrosion in the other stages. The same kind of corrosion was found on the bronze plates of the covers on the suction side of the same pumps. The suction head in this case was about 20 ft.

One of the cast iron impellers in a two-stage boiler feed pump working at a pressure of 240 lb. per sq. in. and running at 3600 revs. per minute, constructed during the war, proved unsuitable for the high pressures and speeds at which it had to work. After three months' service it broke down entirely; some of the heavily corroded blades were broken and also the boss of the impeller was eaten away until it had the appearance of a sponge. Corrosion occurred in this case in spite of the water reaching the impeller under pressure, air being separated out from the water by the strong eddy currents.

The most effective means of eliminating this type of corrosion is to fit an air chamber with air separator before the pump, the air liberated being removed by an ejector or air pump. Otherwise the pump should be installed, when possible, at such a level that the water enters under pressure.

Less common, but as dangerous, is corrosion by electrolytic action. Corrosion of this kind is found mainly in pumps handling water containing acids or salts. In the pumping station of a recently erected plant of the Joninklijke Nederlandsche Hoogovens en Staalfabrieken at Ymuiden, four pumps were installed, two low-lift

pumps, each delivering 15,400 gals. per min. against a head of 47 ft., supplying cooling water for a steam turbine plant, and two medium-lift pumps, each delivering 6,600 gals. per min. against a head of 175 ft. for the blast furnace cooling system. The fact that the pumps had to handle sea water was taken into account when they were made, in that the impellers were constructed of bronze free from zinc, and the shafts were provided with bronze bushes. An easily replaceable tongue, made of bronze free from zinc, was fitted in the spiral casing, which was made of special cast iron, and bronze rings were provided in the impeller where the water passed from it into the casing. After only two months' working, severe corrosion showed itself in the medium-lift pump at the tips of the impeller blades. In the cast-iron casing the machined surfaces, to which the bronze tongue was fixed, were eaten till like a sieve, and only a graphite-like residue was left. The bronze tongue suffered less, but the bronze screws which attached it to the casing, had become so loose in the casing that they fell out, since the cast iron threads had been eaten away.

All conductors of electricity can be arranged in a certain order, the so-called contact series, in which the precious metals stand at one end and the commonest at the other. Without considering all the members of the series, the following is the order of a few metals:—Magnesium, aluminum, zinc, iron, tin, nickel, copper, silver. Two different metals in the series constitute a galvanic element when dipped in an acid, basic or salt solution, and the difference of potential is the greater, the further the metals are apart in the series. In addition, the difference of potential depends on the liquid in which they are placed. If the two metals are directly connected with each other at a point, a short-circuited galvanic element is formed, and a current starts flowing, which, according to Ohm's law, is directly proportional to the difference of potential and inversely proportional to the resistance of the circuit. In addition to the metals, the liquid in which the metals are immersed acts as a conductor of current. The direction of flow of the current through the liquid is always from the less-precious metal, the so-called negative element, towards the more precious electro-positive metal, and in the "outer circuit" it flows from the positive to the negative pole. The metals and liquid forming the galvanic element are at the same time subject to chemical decomposition. In many cases oxygen and hydrogen are produced, the former at the negative pole of the cell and the latter at the positive pole. If the liquid contains a chloride, common salt for instance, chlorine is generated at the negative pole, and hydrogen at the positive. The chlorine produced in this manner is much more corrosive to metal than chlorine produced by a purely chemical process; the compounds it forms with metals are soluble in water. The hydrogen on the other hand acts as a reducing agent and therefore acts as a protection to the metal on which it is produced.

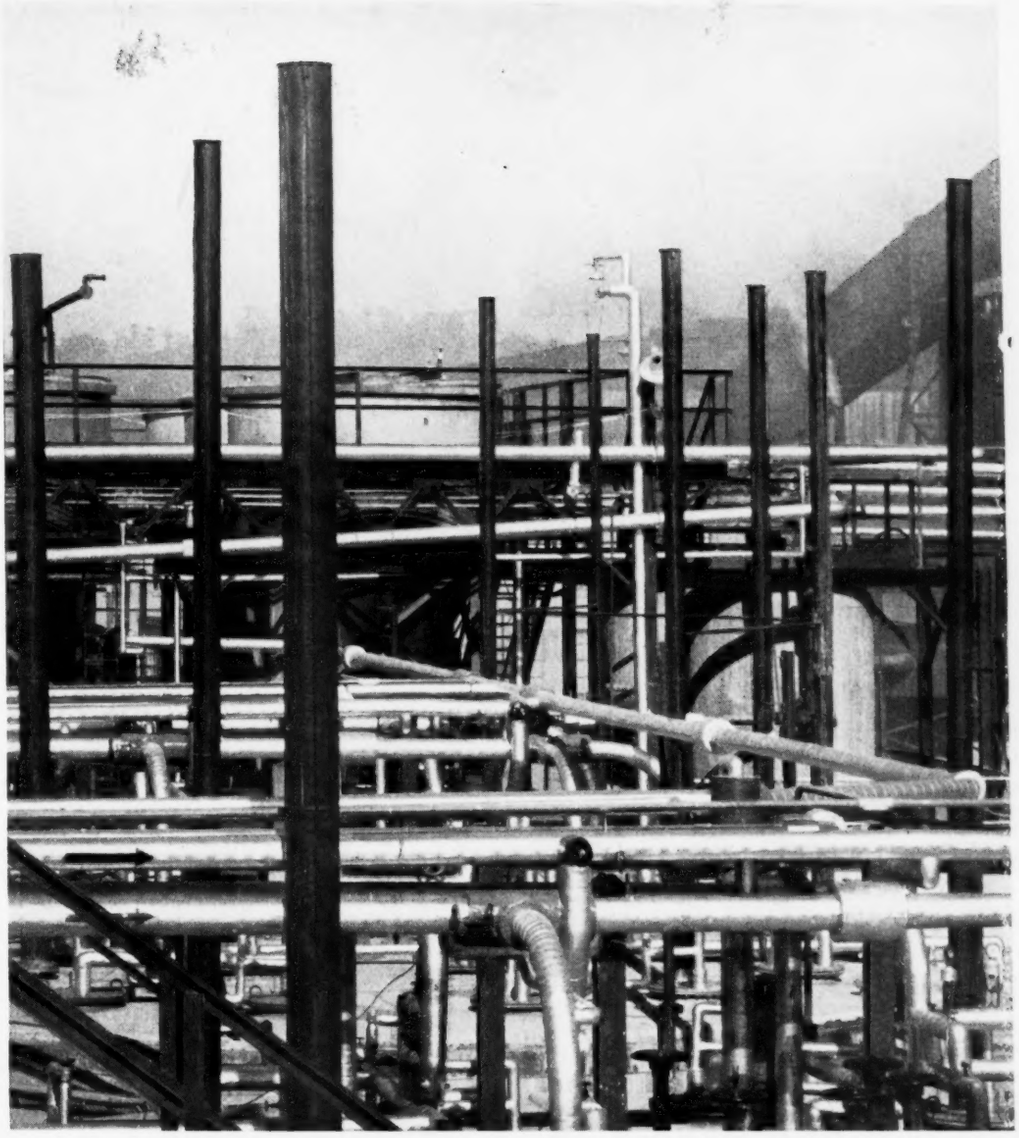
Of the two metals forming the elements of a cell, one is chemically decomposed, i.e., the one forming the negative pole. If, for example, a vessel contains a solution of common salt, and two plates, one of iron and the other of copper, the iron plate will be eaten away by chlorine while the copper plate will be kept bright by hydrogen. Iron alloys, as for example grey cast iron, behave similarly to iron, except that the graphite particles are not decomposed, since they are practically resistant to chemical action and play much the same part as copper after chemical action has started.

On the other hand, no galvanic element is formed when both electrodes of the cell are made of the same material. Any decomposition then occurring can only be due to pure chemical action and is much less severe.

An example of a short-circuited chemical cell, is undoubtedly furnished by the case of the pump already mentioned. In place of copper, we have here an alloy, bronze containing a large proportion of copper. The only parts of the grey cast iron which could be corroded, are those in contact with the salt solution, especially if the chlorine produced was not immediately washed away by the swiftly flowing liquid. With regard to the screws which worked loose through the surrounding cast iron being eaten away, it is evident that the salt solution must have penetrated into the threads. Some parts of the screws, however, still remain tight, so that an "outer circuit," and therefore a short-circuited cell, is formed with the bronze screw as the positive pole and the cast iron as the negative. When the bronze and cast iron can be fitted tightly together, as when both are turned in the lathe—for examp'e, the bronze rings fitted in the wall of the casing—absolutely no corrosion can be observed.

It is more difficult to explain the severe corrosion at the ends of the blades of an impeller, but here also it may be assumed that the cause is to a large extent electrolysis.

In order to eliminate the corrosion entirely, the whole casing was made of a bronze free from zinc; since then no trace of corrosion has been observed either on the casing or on the tongue. It is surprising, however, that the corrosion of the impellers did not stop; but it was much less severe, so that the impellers were not rendered useless until after they had run for about 5,500 hours. The conclusion to be drawn from this is that the impellers are subject to a combined chemical and mechanical action, as well as to electrolytic action due to the gas liberated, its action being increased by strong eddy-currents. It was impossible to prevent the formation of eddies, as the pump was always worked throttled and the impeller was only designed to give half the output which was sufficient when the pumping station was started. It is to be assumed that corrosion will no longer take place when a normal-sized impeller has been fitted in order to give the full output.



Network of pipes on phosphorus storage tanks at Monsanto, Tenn.

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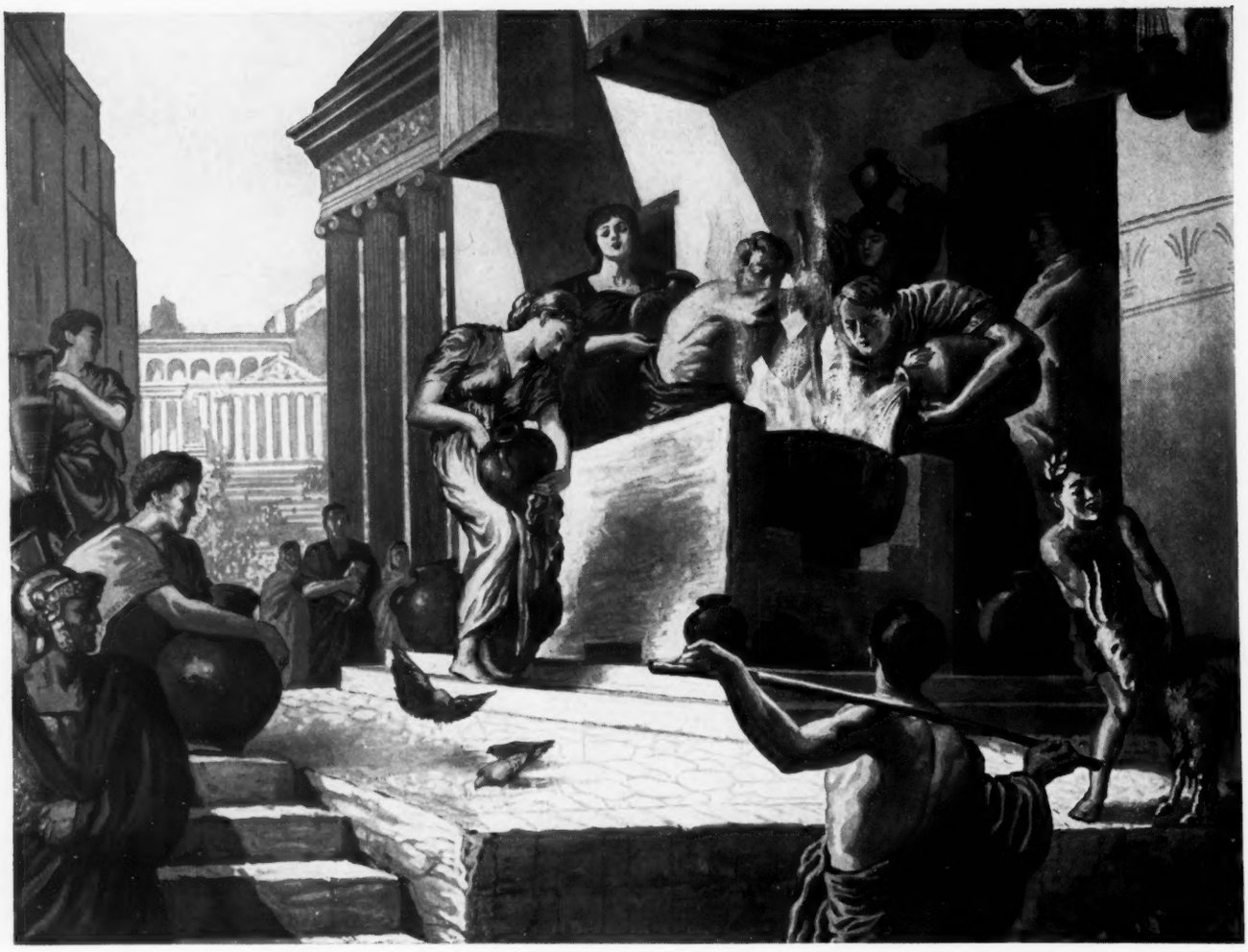

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In the days of Julius Caesar soda was mixed with goats' tallow to make soap. Pliny speaks of two kinds • hard soap and soft soap • as used by the Germans. He says it was originally a Gallic invention for giving the hair a bright hue. The Romans developed soap-making to a fine art through the skillful blending of alkalies and fatty acids, and they used soap as a medicinal as well as a cleansing agent.

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Coolies Build the World's Latest Nitrogen Plant

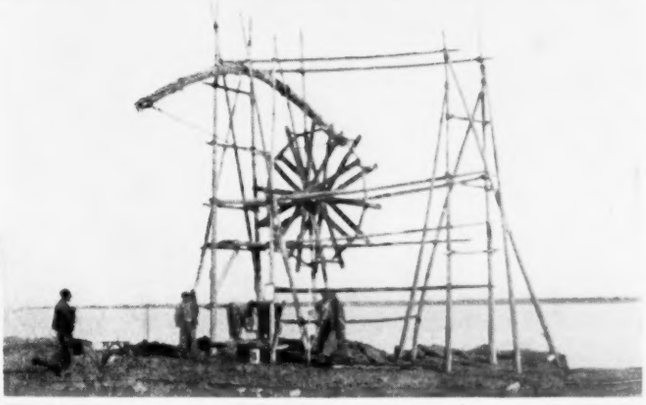
The Yungli Chemical's Operation Suspended by Bombing

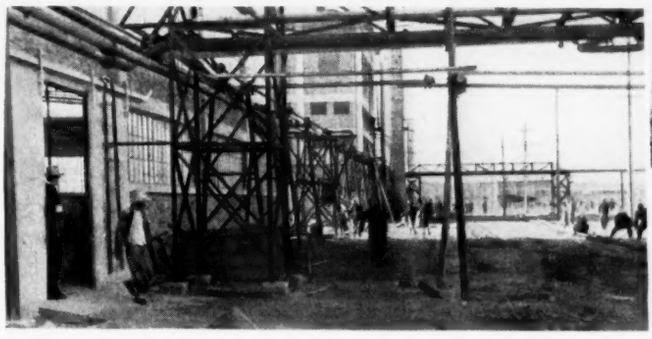
At Hsieh-Chia-Tien, on the north bank of the Yangtze, the world's newest nitrogen fixation plant, completed but a few months ago, has been shut and considerably damaged by Japanese bombing aviators attacking the Chinese capital. Built by the Chemical Construction Corp., to operate the Nitrogen Engineering Corp. system, this completely modern plant was built by primitive labor methods, which competed successfully with contractors using modern equipment.

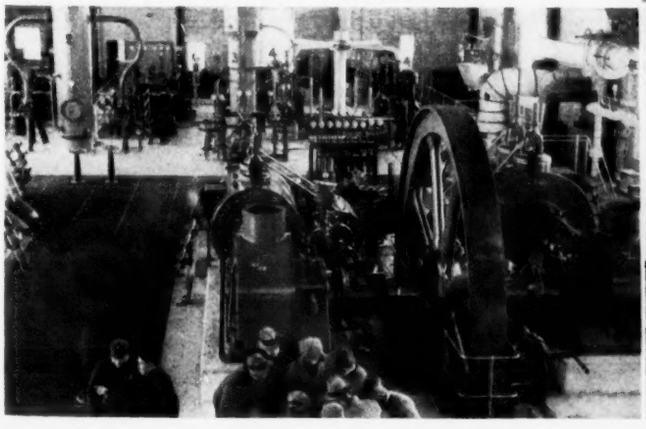
Top row, donkeys transporting rock for the concrete; and hand-sorting of quartz pebbles for the converter fillers in the contact plant.

Above, exterior view; right, above, drilling Well No. 7, a two-man treadmill hoist to operate the drill. Directly right, unloading a sixty-ton forging, directly to the docks of Yungli Chemical Industries, owner of the installation.

Below, a view of the No. 2 compressor, the third and fifth stage separators, refrigerating machines and pumps, and exterior of the machine and boiler shops.

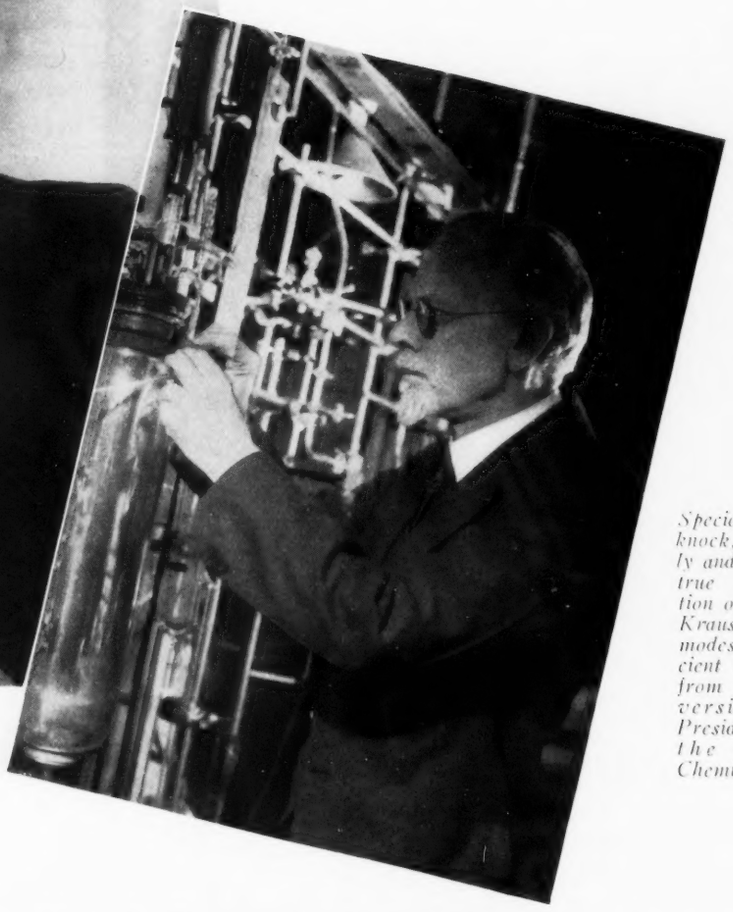






A.C.S. Leaders

Hale and hearty, a teacher who catalyzes the common sense and enthusiasm of his students, author of the new widely used text in Organic Chemistry, adviser to industry, Dean Frank C. Whitmore of Penn State, President of the American Chemical Society.



Specialist in antiknock, is chemically and personally a true characterization of Prof. C. A. Kraus, the ultramodest, quiet, efficient research man from Brown University who is President-Elect of the American Chemical Society.

This Year's Insecticide Officers

J. L. Brenn, newly elected president of the National Association of Insecticide and Disinfectant Manufacturers, graduate in chemistry of Valparaiso, founder (1919) of Huntington Labs., Inc.

Wallace Thomas, Gulf Refining, one of the widest known and best liked men in the field, now second vice-president of the Association.

William J. Zick, Stanco, Inc., who, at the twenty-fourth annual meeting in New York City, was elected first vice-president of the Association.

on the Firing Line of Chemistry

Hawaiian: J. N. S. Williams, Chairman

Erie: Dr. Donald T. Jackson, Chairman; V. Ross Reed, Secretary-Treasurer

South Carolina: Willard A. Whitesell, Chairman

Section Officers: 1938

(Others Coming Next Month)

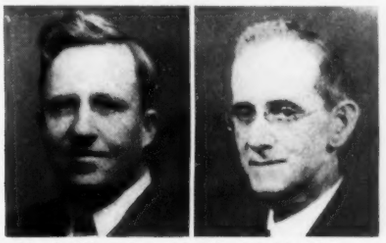
Indiana: Lawrence Newburn, Secretary; A. N. Stevens, Chairman

Toledo: Nelson Horey, Chairman; Dr. Julian H. Toulouse, Secretary

Southeast Tennessee: Emerson P. Poste, Secretary; J. H. Barnett, Jr., Chairman

Lexington: Dr. Fred W. Oberst, Secretary; Chas. F. Krewson, Chairman

St. Louis: Dr. Jules Bebie, Chairman; Dr. Henry A. Carlton, Secretary



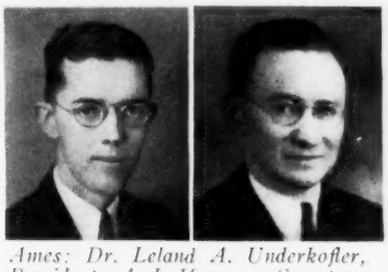
Nashville: Dr. H. A. Webb, Secretary; Dr. J. C. Carlin, Chairman

Rochester: Thos. F. Murray, Jr., Secretary; Dr. Chas. R. Fordyce, Chairman

Purdue: Charles L. Shrewsbury, Secretary; Prof. John L. Bray, Chairman

Chicago: James J. Doheny, Jr., Secretary; Dr. J. C. Morrell, Chairman

Cincinnati: W. H. McAllister, Secretary; R. H. Ferguson, Chairman



Ames: Dr. Leland A. Underkofler, President; A. J. Hammer, Secretary

Eastern New York: A. L. Marshall, Chairman; E. K. Bacon, Secretary

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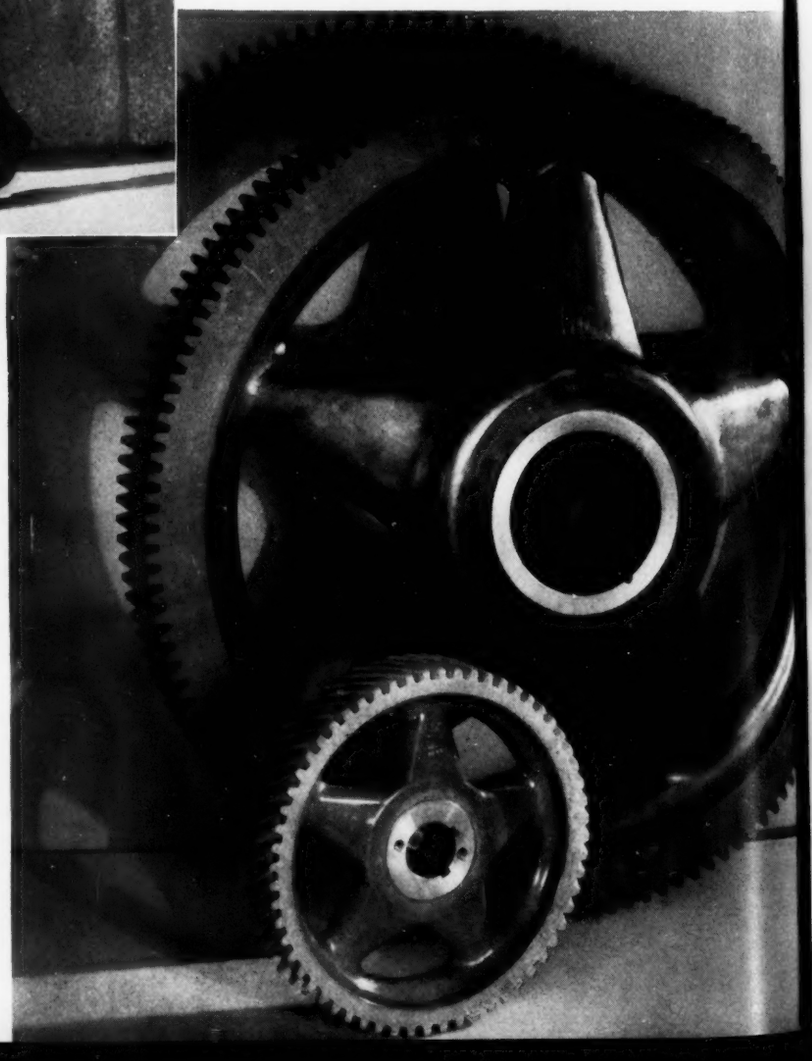
Plastic Materials Display New Versatilities

At the Second "Modern Plastics" competition, held recently in New York, first award in the Style Group was given to this hat (by Louiscanders), trimmed with Plastacele, a du Pont plastic.

An application of science to a distinctly practical purpose is demonstrated in the Tracelarm Protection Bag, which won first prize in the Scientific Group. It is a steel-mesh lined leather bag, designed for transporting money, securities, etc., and contains a mechanism which automatically locks the bag when seized by a thief. After a delayed period a series of detonations is produced, and dense streams of yellow-tracer smoke are emitted. One of the most intricate moldings ever made, with metal inserts and eleven intercommunicating chambers, developed of Durez, is used as part of the assembly.



The Celeron Spoke Gear, a unit which represents an advanced step in the evolution of nonmetallic gears for elimination of noise in the timing mechanism of high-speed motors, took third award for Studebaker Motor Corp. in the Industrial Group. Celeron, the plastic material used, lends itself ideally to applications of this type, and particularly impressive reports on satisfactory performance have been received from Greyhound buses. Gear was designed and manufactured by Continental-Diamond Fibre.

Plant Operation and Administration

A digest of methods and equipment

Sodium Hydrosulfite

Produced by Bisulfite Electrolysis

IN 1930, production of sodium hyposulfite ($Na_2S_2O_4$ known commercially as sodium hydrosulfite) by the electrolytic reduction of sodium bisulfite was described by Rabinowitsch and Fokin (*Z. Electrochem*, 1930, 36, 839), who claimed current yields of 70-80 per cent. The electrolytic method of hyposulfite production does not, however, appear as yet to have reached the commercial stage, but a group of patents (E.P. 475,058, 475,059 and 475,060 of 1936) granted to I. G. shows that research on the method, published in *The Chemical Trade Journal*, Dec. 17, '37, p. 540, has been systematically proceeding and that modifications which allow of considerably increased efficiency have been arrived at.

According to the first of the above-mentioned specifications, all attempts to prepare hyposulfite by means of electrolysis, of bisulfite solutions, have proved it necessary to keep the catholyte in rapid motion. A high current concentration is also required for obtaining a good yield of hyposulfite, that is to say, a relatively small cathode chamber is necessary, and it has been very difficult to fulfil both requirements simultaneously.

In the new process, hyposulfites are prepared by cathodic reduction of bisulfite-containing solutions by performing the electrolytic reduction at a current concentration of more than 1 ampere per 100 ccs. of catholyte, while moving the catholyte by passing a current of an indifferent gas there-through. The current concentration can be closely regulated, since a part of the cathode chamber is filled with gas bubbles and consequently less liquid is present in the cathode chamber. Preferably current concentrations between about 5-50 amperes per 100 ccs. of catholyte are used. The movement of the catholyte caused by passing an indifferent gas through it is, it is claimed, so strong that secondary reactions are practically avoided, so that even in the case of dilute bisulfite solutions of only about six per cent. $NaHSO_3$ as initial material, about 100 per cent. current yield is obtained.

Stirring by means of gas is claimed to be particularly advantageous if SO_2 is introduced into the catholyte. A particular method of executing the process is by effecting simultaneously with the gas stirring a pumping of the cathode liquid by providing a reflux pipe leading from the upper to the lower part of the cathode chamber.

A further improvement of the process is by effecting the electrolytic reduction, using cathodes of thin wires, preferably of a diameter of between about 0.1-0.5 mm. The wires are arranged in such a manner that spaces are formed between the individual wires, so that the catholyte passes through and thus comes into intimate contact with the surface of the wires. The space between the wires or, if the wires are in the form of a net, the mesh-width is more than 0.5 mm. The following is one of the examples given in the specification:

In a cylindrical chamber consisting of a lead cylinder, which can be cooled from the outside and which serves as the cathode, a clay tube arranged therein as a diaphragm and a graphite tube arranged within the diaphragm serving as the anode, electrolysis is effected using an 18 per cent. sodium bisulfite solution as catholyte and saturated common salt solution as anolyte with a current density of 4 amperes per square decimetre and a current concentration of 8 amperes per 100 ccs. During the electrolysis the catholyte is pumped so that its current velocity amounts to 25 cm. per second. If the required SO_2 is added to the circulating catholyte outside the chamber, a 12 per cent. hyposulfite solution is obtained. If the SO_2 is blown into the cathode chamber from below, the hyposulfite concentration and the current yield are increased to 13 per cent., and 68-70 per cent., respectively, while the other conditions remain the same. If the pump is turned off and hydrogen, with which SO_2 is admixed, is introduced into the cathode chamber by means of a distributor from below, a 14 per cent. sodium hyposulfite solution with a current yield of 76-78 per cent. is obtained.

In E.P. 475,059, there is claimed specifically the moving of the catholyte along cathodes consisting of thin wires by introducing into the catholyte an indifferent gas, such as carbon dioxide, hydrogen or nitrogen.

As catholyte, bisulfite solutions are used or salt solutions in which by introducing SO_2 before or during the electrolysis the bisulfite necessary for performing the process is prepared. As anolyte, sulfuric acid, acid, neutral or alkaline reacting salt solutions or also alkali metal or ammonium hydroxide solutions come into consideration. By the process of the present invention it is possible, it is claimed, to prepare hyposulfite solutions with a current and bisulfite yield of 80 per cent. and more, from which solutions solid hyposulfite is prepared on a satisfactory technical scale. Cylindrical or filter press-like cells may be used, while the wire cathodes may be of harp-like or net-like construction as desired. The following is an example given in E.P. 475,059:

An electrolytic cell consisting of a silver tube which can be cooled from the outside is provided with a cathode consisting of a silver wire net of 2 mm. mesh-width inside the tube. The wires forming the cathode are 0.25 mm. thick. Within the wire net a clay tube is arranged as the diaphragm, in the interior of which a lead tube is provided as the anode. The catholyte is a 23 per cent. solution of sodium bisulfite, the anolyte is a 20 per cent. sulfuric acid solution. For stirring, a strong current of carbon dioxide is passed through the catholyte from below. Electrolysis is effected with a current concentration of 10 amperes per 100 ccs. of catholyte and a cathodic current concentration of 6 amperes per square decimetre. In this manner a 16 per cent. solution of sodium hyposulfite is obtained with a current yield of 80 per cent.—that is to say a bisulfite yield of more than 80 per cent. is obtained. If the wire cathode employed is replaced by another cathode, for instance, a plate cathode, the yield is lowered by about 10-30 per cent., depending on the strength of the hyposulfite solution obtained.

E.P. 475,060 covers a modification of the process in which an alkaline-reacting anolyte, a part of which passes through the diaphragm into the cathode chamber, is used. The passage is effected in a simple manner by keeping the level of liquid in

Although the word "hyposulfite" employed in the patent specifications cited is used throughout our abstract, the product referred to is not sodium thiosulfate (the "hypo" of the photographer), but the material known commercially as sodium hydrosulfite.

the anode chamber above the level of liquid in the cathode chamber. Thereby the diffusion of hyposulfite into the anolyte is avoided to a marked extent, whereby an improvement of the yield is attained. By this method of working, clogging of the diaphragm is avoided and a continuous process made possible.

A preferred feature of E.P. 475,060 consists in electrolyzing an alkali metal sulfite solution as anolyte. This solution is transformed into bisulfite and sulfate by electrolysis. Since the sulfate content does not affect the cathodic hyposulfite production, the bisulfite-containing anodic solution can be used directly as catholyte. The remaining part can be worked up to SO_2 and sulfate by the addition of sulfuric acid. The SO_2 obtained may be used again in the process. The following is an example:

A cell is provided with a silver wire net cathode, a diaphragm and lead anode for the electrolytic production of hyposulfite. For stirring the catholyte a continuous current of carbon dioxide is passed through. Electrolysis is effected without interruption for 3 hours 38 minutes at a current concentration of 20 amperes per 100 ccs. at 500 amperes charge and a potential of 5.5 volts. During the process no catholyte but only anolyte liquid is introduced. The liquid necessary for the cathode is transported by means of hydrostatic pressure from the anode chamber through the diaphragm into the cathode chamber. During the operation the cathode liquid contains 135-140 grammes of $Na_2S_2O_4$ per litre, 50 to 70 grammes of $NaHSO_3$ per litre, 20 to 50 grammes of Na_2SO_3 per litre and small quantities of thiosulfate. The anode liquid contains 20 grammes of Na_2SO_3 per litre, 70 grammes of $NaHSO_3$ per litre, and 50 to 100 grammes of $NaSO_4$ per litre. Altogether 22.2 kgs. of sodium sulfite are used, which is added to the anolyte in a 13.7 per cent. solution. 5.4 kgs. of hyposulfite are obtained in a 13 per cent. solution and 9 kgs. of bisulfite in a 7 per cent. solution. During the process 4.1 kgs. of gaseous SO_2 are introduced into the catholyte, together with the stirring gas. The SO_2 is recovered by acidifying from the bisulfite solution obtained as by-product. The current yield amounts to a little more than 90 per cent.

Diethyl Sulfate as Ethylating Agent

The value of diethyl sulfate as an ethylating agent is discussed by R. Brédeau in *La Revue des Produits Chimiques,* November 30. Diethyl sulfate, it is stated, is available as a commercial product with the following properties: Density, 1.177 to 1.182 at 20°/20° C.; boiling range, more than 95 per cent. distilling between 106° and 111° C. under 25 mm. of mercury; purity, higher than 95 per cent. by weight; solubility, entirely soluble in ether and alcohol.

The ester is stated to be uninflammable, while no indication has been obtained that it possesses any particularly toxic properties. Its behavior in this latter respect is in marked contrast to that of dimethyl sulfate, which is an especially toxic material. Diethyl sulfate is also stated to be quite non-corrosive. In the majority of cases, ethylation can be effected between 50° and 55° C., although in some cases a temperature as high as 110° C. is necessary for full reaction to be obtained. The first ethyl group in the diethyl sulfate reacts very readily, but if complete combination with the second group is desired, ethylation temperatures of 145° C., as well as rather protracted periods of heating, are necessary. A large number of experiments have been carried out on use of diethyl sulfate as an ethylating agent, and further instances reported in *Chemical Trade Journal,* Dec. 31, '37, p. 603.

Butyric Aldehyde Process

Butyric aldehyde is obtained in 50 per cent. of the theoretical yield by catalytic dehydrogenation of normal butyl alcohol in presence of zinc oxide, according to Rivkine and co-workers (writing in *Sintet. Kaoutchouk*). The optimum temperature is 450° C. and butyl butyrate is simultaneously formed in 10 per cent. of the theoretical yield. From *Chemical Age,* Dec. 4, '37, p. 455.

Catalytic Dehydration Ethyl Alcohol

Experiments on the catalytic dehydration of ethyl alcohol by samples of commercial alumina are reported by Alexander, Horn, and Munro (*Can. Jour. Res.,* '37, *15,* 10, 438) and noted in *Chemical Age,* Dec. 11, '37, p.477. The effect on the dehydrated characteristics of two samples of ordinary commercial alumina, of variation of the water content at 318°, was investigated. It was found that there was one optimum content of two per cent. at which the production of ethylene was at a maximum, and the production of ether was practically zero, and another optimum point at six per cent. at which the characteristics were exactly reversed. When operating with catalysts of high initial water content (10-20 per cent.), the efficiency for either process passed through a series of maxima and minima as the amount of alcohol decomposed increased. The height of the maxima decreasing as the age of the catalyst increased.

Production Pure Benzyl Chloride

Bianchini *(Ann. Chim., Appl.,* 1937, *27,* 422-426) describes a small scale plant for efficient production of pure benzyl chloride from toluene by direct chlorination. Gaseous chlorine is led into toluene contained in a vessel immersed in a steam heated mineral oil bath. Temperature is so adjusted that the reaction takes place in the vapor phase; the hydrogen chloride resulting from the interaction passes up a vertical condenser in which any of the reactant or product are condensed and drops back into the reaction vessel, while the acid gas is cooled in a worm and is then absorbed in water to form 20° Bé acid, a valuable by-product.

When operating on 50 kg. charges of toluene, practically complete conversion can be obtained in 24 hrs. The benzyl chloride is syphoned out of the reaction vessel, into a tank, where it is thoroughly washed by agitation with water, and is further purified, if necessary, by distillation. Product thus obtained is substantially pure, as is shown by its chlorine content (25-26 per cent.), and is of constant physical properties from batch to batch.—*Chemical Age,* Dec. 18, '37, p.493.

Gas-extracted Benzol

Variability in composition of benzol extracted by scrubbing from coal carbonization gases has been investigated systematically by Société Lyonnaise des Eaux et l'Eclairage. The broad results of the work, reported by G. Kimpflin in *Chimie et Industrie,* September, are that the content of the crude benzol in aromatic compounds grows, and its content in saturated and ethylenic hydrocarbons drops, as the gas-production process is modified from continuous distillation with steaming to dry distillation in coke-ovens. When the same method of distillation is maintained, the content of aromatics in the crude benzol increases as the volume of the retort decreases, due to the catalytic action of the side walls. Some reported results follow:

Crude benzol scrubbed from gas produced in a Glover-West type 4-ton retort (continuous steaming method) contained 62.2 per cent. aromatics, 16.8 per cent. unsaturated hydrocarbons, and 21 per cent. saturated hydrocarbons. From gas produced in a Glover-West type retort of 2.8 tons capacity, the benzol obtained contained 72.5 per cent. aromatics, 17.5 per cent. unsaturated hydrocarbons, and 10 per cent. saturated hydrocarbons. Crude benzol scrubbed from coke-oven gas was found to contain 88.8 per cent. aromatics, 1.4 per cent. saturated hydrocarbons, and 1.8 per cent. unsaturated.

In investigating the chemical refining of the crude benzol the same company finds that the aromatic content of the material can be increased by treatment with metallic chlorides or oxidizing agents. In one experiment reported, a crude benzol with an initial aromatic content of 63.2 per cent. had a final content of 77.8 per cent., its content in ethylenic derivatives being lowered from 20.8 to 6.2 per cent. Noted in *Chemical Trade Journal,* Oct. 15, '37, p.341.

Booklets & Catalogs

Companies whose booklets are reviewed on this page will be glad to supply readers of "Chemical Industries" with copies free, provided this magazine is mentioned and the request is made on company stationery. Your business title should also be given.

After Thirty Years. Booklet, commemorating thirtieth anniversary of founding of American Cyanamid Co.; reviews company's achievements from its foundation in 1907 for manufacture and sale of a single nitrogen fertilizer material to the present time when it employs approximately 10,000 individuals and serves more than a hundred industries. American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, N. Y. City.

Airless Rotoblast. Folder, illustrated, describes equipment available for any blast cleaning job, gives outstanding features of cheaper and faster cleaning units. Pangborn Corp., Hagerstown, Md.

Alloy Metals Review. December, 1937, published quarterly, features articles dealing with various adaptations of alloys in industry, contains list of abstracts and references in this field, can be had upon application to publishers, High Speed Steel Alloys, Ltd., Ditton Road, Widnes, Lancashire, England.

Amber. Booklet, complete description of this natural insulating material, from its historical derivation to properties, uses, and prices. Amber Mines, Inc., 9 Rockefeller Plaza, N. Y. City.

Brinell Meter. Booklet, adequate details of portable apparatus for accurate determination of hardness and tensile strength of metals and metal products, independent of their dimensions. Louis C. Eitzen Co., 280 Broadway, N. Y. City.

Chemicals by Glyco. Latest edition, complete index of products, formulas, and uses, making information on these products easily available to users. Glyco Products Co., Inc., 148 Lafayette st., N. Y. City.

Concretdense. Folder on versatile new material which completely changes structure of concrete; for hardening, waterproofing, setting in 18 hours, and cold weather work. Flexrock Co., 800 No. Delaware ave., Phila., Pa.

Condenser Tubes. Booklet, Air and Erosion Eliminator which removes cause of tube end destruction and increases life of tubes three times, of interest to engineers eager to maintain economical condenser maintenance. Condenser Service & Engineering Co., 310 12th st., Hoboken, N. J.

Control. Bulletin No. 1172, the TAG Snapon Control, Type R-40, without overload motor protection, gives illustrations and specifications. C. J. Tagliabue Mfg. Co., Park & Nostrand aves., Brooklyn, N. Y.

Fluxuations. Number 7, interesting notes on fundamentals of foundry chemistry, hints on melting metals, also list of company's products in this line. Foundry Services, Inc., 107 E. 41st st., N. Y. City.

High Intensity Mercury Lighting. Folder F-8409, equipment and accessories for both mercury and combination mercury-incandescent units, also illustrations of applications in industrial plants. Westinghouse Electric & Mfg. Co., Cleveland, O.

Homogeneous Linings for Equipment. Bulletin, outlines newest work in homogeneous linings, also types. Homogeneous Equipment Co., Downingtown, Pa.

Industrial Compressors and Vacuum Pumps. Bulletin No. 2118, on Type 30 line, which ranges in size from ¼ to 15 h.p.; complete rating tables of more than 50 models given, including physical dimensions and shipping weights, etc. Ingersoll-Rand Co., 11 Broadway, N. Y. City.

Industrial Machinery. For tumbling, separating, cleaning, washing, burnishing, plating, and pickling metal parts, Catalog No. 36, descriptions and illustrations. N. Ransohoff, Inc., W. 71st st., at Millcreek, Carthage, Cincinnati, O.

Laboratory Mixers. "Lightnin" Models "L" and "V," booklet, features, specifications, prices, and other necessary data of interest to prospective users. Mixing Equipment Co., Inc., 1062 Garson ave., Rochester, N. Y.

Metal Sprayed Surfaces in Relation to Lubrication. Booklet, reprinted from paper read before the Association at Reynolds Hall, College Technology, Manchester, Oct. 20, '37, of particular interest to plant executives and engineers. May be had upon application to Metallizing Engineering Co., Inc., 44 Whitehall st., N. Y. City.

Mixers. Pamphlet, describes new "Lightnin Bearing Guard" unit, designed to produce maximum agitation. Mixing Equipment Co., Rochester, N. Y.

Mixing Equipment. "Lightnin" line, folder, plain facts on how to cut mixing costs; exclusive features of company's line, uses, materials, and list of actual, typical users. Mixing Equipment Co., Inc., 1034 Garson ave., Rochester, N. Y.

Molded Durez. Booklet, 12 pp., portrayal of important role plastics are playing in radio manufacture today; hints on radio designing, and physical property chart complete story. General Plastics, Inc., North Tonawanda, N. Y.

Moly Matrix. December, 1937, feature article "Versatility of Molybdenum Steel an Asset." Climax Molybdenum Co., 500 5th ave., N. Y. City.

Multiple Recording Potentiometer Pyrometer. Catalog No. 1102, full details on new addition to Brown line, the Multi-Color Numeral Printing Potentiometer, which incorporates new features of simplicity of design, ruggedness, and durability. Brown Instrument Co., Phila., Pa.

Neoprene Notebook. Vol. 1, No. 1, new publication to be issued regularly, designed to give engineers and manufacturers engineering information, laboratory data, and application reports. First issue features: "Vibration Dampening, Permanent Set and Thermal Conductivity Properties of Neoprene." Those interested in receiving this publication should write to the Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Wilmington, Del.

Organic Methods of Scale and Corrosion Control. Booklet, 16 pp., second edition, technical exposition of applications of organic chemistry in this field given in plainly understandable language, describes underlying principles, profusely illustrated with graphs, formulas and equations. Of interest to those responsible for scale or corrosion control in industrial operations. D. W. Haering & Co., Inc., 3408 Monroe st., Chicago, Ill.

Oxy-Acetylene Tips. January, 1938, reviews achievements in this field for 1937. Linde Air Products Co., 30 E. 42nd st., N. Y. City.

Power Cost. Bulletin 101, how 43 plants cut power costs for driving 19 different types of auxiliaries to an average of ½ cent per k.w. hr., with tabulated results. Troy Engine & Machine Co., Troy, Pa.

Power Specialist. Nov.-Dec., 1937, insulation problems described. Johns-Manville, 22 E. 40th st., N. Y. City.

Pyrometers. Catalog No. 1101-D., 28 pp., details and illustrates many unique features of TAG Celectray indicating, recording, and controlling pyrometers and resistance thermometers, which utilize a phototube, mirror galvanometer and a beam of light; price list included. C. J. Tagliabue Mfg. Co., Park & Nostrand aves., Brooklyn, N. Y.

Recorders for Electrical Unit Readings. For close control and to reveal losses in excess power consumption that may be readily eliminated; Bulletin No. 496, operating characteristics and various applications. Bristol Co., Waterbury, Conn.

Roller Mill. Leaflet, illustrates and gives specifications of Kent Senior Super 5 Model, involving simple construction and easy operation. Kent Machine Works, 37 Gold st., Brooklyn, N. Y.

Savings and American Progress. Booklet, 32 pp., sequel to "Capital Goods and American Progress" and further discussion of the relation of wealth-creating enterprise to employment and the American standard of living. Machinery & Allied Products Institute, 221 No. LaSalle st., Chicago, Ill.

Sharples Synthetic Organic Chemicals. Booklet, 60 pp., indicates scope of company's manufacturing and research activities; first edition to include other than amyl derivatives; compounds fully described with specifications, physical properties, and many new uses for each; also included are a number of semi-commercial and laboratory products, listed under proper classifications. Sharples Solvents Corp., 23rd & Westmoreland sts., Phila., Pa.

Simple Methods of Analyzing Plating Solutions. Booklet, 24 pp., methods of analyzing plating solutions in practical operation and as used in company's laboratories; contains also list of all equipment and solutions necessary for analysis. Hanson-Van Winkle-Munning Co., Matawan, N. J.

Standardized Cylindrical Tanks. Bulletin B-1, complete technical data on cylindrical tanks, covers, and outlets molded from Haveg "41", of interest to every plant operating official where chemical corrosion enters into the manufacturing process. Haveg Corp., Newark, Del.

TAG Snapon Temperature & Pressure Controls. Catalog 1136A, describes Types R-18 and R-19 with overload relay, gives specifications and illustrations. C. J. Tagliabue Mfg. Co., Park & Nostrand aves., Brooklyn, N. Y.

The Art of Proportioning. Catalog, 24 pp., second edition, discusses application of hydraulic piston and fundamental design requirements for accurate proportioning of any solution into liquids or gases; illustrations and drawings included. D. W. Haering & Co., Feeder Division, 3408 Monroe st., Chicago, Ill.

The Laboratory. Vol. 9, No. 3, interesting historical article on "Evolution of the Balance"; newest developments in laboratory apparatus. Fisher Scientific Co., Pittsburgh, Pa.

"THQ Makes Possible Sulfate Determinations by Direct Titration." Paper, fully covers rapidity, accuracy and economy of this method, gives procedure of detail, and illustrates necessary equipment. W. H. & L. D. Betz, 235 W. Wyoming ave., Phila., Pa.

Tile Conduit. Bulletin No. 35-67A, on Adsco-Bannon Tile Conduit and Adsco-Corning Filler Insulation for underground steam or hot water lines; includes illustrations, applications, and details of construction. American District Steam Co., N. Tonawanda, N. Y.

Twenty-Five Years. Booklet, 64 pp., marks quarter of a century of outstanding accomplishments, from manufacture of explosives to production of synthetic lacquers and finishes, emphasizing contributions of chemist and engineer to increasing usefulness and beauty in present standards of fine living; also special salute to Atlas employees, especially those with company for 25 years or more. Atlas Powder Co., Wilmington, Del.

Twenty-five Years of Continuous Service to Industry. Booklet, silver anniversary of Diamond Alkali, marking advance in production from one product in 1912 to over one hundred at the present time, and the attainment of a prominent position among industrial users, based on maintenance of high quality standards for their products. Diamond Alkali Co., Pittsburgh, Pa.

Two-Roll Spring-Relief Coal Crusher. Chain Drive Type "C", combining in one unit, large capacity with limited degradation and ease of adjustability for regulating size of product. Catalog No. 1654 covers all sizes. Link-Belt Co., 300 W. Pershing rd., Chicago, Ill.

Equipment News

Gordon M. Jackson has become affiliated with Struthers-Wells, Warren, Pa., as New York District Manager of the Heat Exchanger Division, bringing to his new work a broad experience in the equipment field in California, Texas, Oklahoma, and the east. He will direct the design, application and sales in this district, especially for the oil and natural gas industries and will make his headquarters at 30 Rockefeller Plaza.

Dr. E. H. Leslie has joined the technical staff of Blaw-Knox, Pittsburgh, to be in charge of the supervision of the design and fabrication of operating units for the chemical and oil refining industries. He is well known through his research in the application of advanced chemical engineering to the problems of the chemical, petroleum refining and processing industries generally.

New Chemicals for Industry

A digest of products and processes

Industrial Uses of Benzol

Some Lesser Known Applications

THERE is practically no limit to the industrial uses of benzol but, for the convenience of studying the principal applications, they can roughly be divided into the following groups: cellulose lacquers; leather; plastics; adhesives; polishes, paints and varnishes; paint and varnish removers; cleaning and degreasing agents; mothproofing; motor fuels; carbon removers and lubricants; rubber; waterproofing; and photography. Several uses would obviously fall into more than one group, for example, adhesives for rubber, leather and films, cleaning agents for leather, etc. A whole article might well be devoted to each of the twelve groups, but these notes are intended to give no more than a general review of the possibilities.

A series of 15 typical prescriptions for lacquers mention benzol as an essential constituent. A linoleum lacquer (hard finish), for example, contains no less than 55 per cent. by weight of benzol, and a similar lacquer with a flexible finish contains 51 per cent. The formulæ for three nitrocellulose lacquers specify 22, 19 and eight per cent. of benzol respectively, and three clear brass lacquers 20, 20 and 19.6 per cent. A cotton solution for the production of lacquers contains 40 per cent.; a patented lacquer black coating 35 per cent.; playing card lacquer 33 per cent.; a brushing lacquer 14.2 per cent.; a clear dipping lacquer 11 per cent.; a patented anti-fouling lacquer 8.4 per cent. and a wallpaper lacquer 8.9 per cent.

The leather and artificial leather industries are large consumers of benzol, as evidenced by the considerable number of formulæ applicable to their particular trades. One of the oldest and best known leather dressings consists of a solution of four parts rosin in 96 parts of benzol, with a trace of aniline. Two typical leather dyes, one black and one brown, each use 80 per cent. benzol.

A patented artificial leather base employs 500 parts of benzol in a total of 1,920 parts. In a coating lacquer for producing artificial leather on a coating machine benzol represents over 42 per cent. of the total ingredients, while several patented processes for the manufacture of artificial leather provide for the use of substantial quantities of benzol. Closely allied to the leather industry is the manufacture of shoe polishes which also absorbs a considerable quantity of benzol.

In the plastics field there is a growing demand for benzol. It is sufficient here to refer to one of many representative formulæ. A patented plastic composition used for dental and other moulding or modelling purposes consists of 200 parts of benzol to 100 parts of ethyl benzyl cellulose, three parts of triphenyl phosphate and three parts of tricresyl phosphate.

Adhesives in which benzol is used cover a wide range of applications, from stationery to metal and from cinematographic films to leather and rubber. A simple patented mica adhesive consists of three parts benzol to two of gilsonite and one of rubber, and may be thinned down with benzol or naphtha. A rubber to metal cement employs 6,800 lbs. benzol to 68 lbs. crepe rubber and 40-80 lbs. bromine.

A solution of rubber in benzol is used as an adhesive for envelopes which cannot be re-sealed after having been opened. Adhesives for bonding paper to moisture-proof Cellophane, for soft and hard rubber and for rubber-to-metal joining are other spheres of usefulness for the application of benzol in quantities varying from eight to 25 per cent. of the total constituents.

Polishes, paints and varnishes provide, next to the motor and dyestuffs industries, probably the largest individual market for benzol in industry. A furniture polish being used by one of the largest furniture houses in America contains three parts by volume of pale lubricating oil and two parts benzol. The benzol softens the surface, permitting the oil to leave a thin film. A representative stove polish is made with 19 per cent. benzol, 19.7 per cent. kerosene, 14.3 per cent. asphaltum, three per cent. lamp black and 44 per cent. Mexican graphite.

Rustproof black paint for metals, aluminum tar paint, anti-corrosive and anti-fouling paints, cellulose motor enamel, auto top dressings and paint for moderately heated metal surfaces are among the principal paint products in which benzol plays a vital part. An aluminum tar paint may be prepared by mixing 50 parts coal tar with 20 parts crude benzol, 20 parts toluol, 10 parts xylol and suitable quantities of aluminum powder.

Paint and varnish removers occupy an equally important place in the benzol market and from the heavier industrial applications the uses range down to a finger nail polish remover, containing 40 per cent. benzol, against the 25 per cent. employed in making the polish originally applied to the nails.

Cleaning and degreasing agents are among the more obvious applications and involve in general the use of higher percentages of benzol. The removal of stains is closely akin to the removal of paints and varnishes and some of the formulæ tend to overlap. Candle drippings are removed with lard and benzol; gum stains with carbon tetrachloride and benzol, and shoe polish stains with benzol alone. A useful hint in connection with degreasing refers to the removal of lubricating oil stains from concrete; benzol is mixed with a dry powder, such as hydrated lime, marble dust or whiting, to form a paste which is plastered over the stain.

The textile industry's main interest in benzol is associated with dyeing, but there are other directions in which it is well served. Mothproofing is a case in point. It is not generally known that benzol is employed as a solvent in certain proofing processes, and is thus contributing to a reduction in the total loss through moth-damaged fabrics, which, in Great Britain alone, is estimated at a million pounds annually.

The rubber industry is dependent upon benzol for adhesives, shoe varnishes (some of which contain as much as 50 per cent. of benzol), repairing lacquers for galoshes, rubber asphalt lacquers, leather-to-rubber cements, artificial rubber latex and colored rubber. A typical patented rubber matrix is composed of three lbs. commercial rubber cement, two lbs. carbon tetrachloride, two lbs. benzol, four lbs. chemically pure talcum powder and one-half oz. carbon black. Closely allied to rubber is waterproofing, another appreciable field for benzol utilization. An effective waterproofing liquid for cloth or wood can be obtained from a mixture of paraffin, gum damar, pure rubber and benzol, to which carbon tetrachloride is added.

The photographic industry employs benzol chiefly as a constituent in film cements, of which quite a number of formulæ have been published. In one prescription it comprises 45 per

cent. of the cement. In the case of safety films the percentage of benzol is slightly less, but in every case benzol is an indispensable ingredient.

Benzol is produced in three grades: (a) commercially pure benzol, a high grade product also suitable for nitration and sulfonation in the production of intermediates, (b) 90's benzol, more commonly used as a solvent for various purposes, and (c) motor benzol for internal combustion engines. The three grades each have their special qualities. Pure benzol can be subdivided into two classes, commercially "pure benzol" and a still more highly refined product known as "pure benzol for nitration." The latter has a narrower distillation range and a slightly better wash test. Both are specified to be free from sulfur, determined by H_2S or SO_2 and to be non-corrosive. Both products normally distil from first drop to dry point within 2° C., this range including the boiling point of benzene, approximately 80° C.

90's benzol is a grade most commonly used for industrial purposes. The standard distillation test specifies that at least 90 per cent. by volume distils below 100° C. and at least 97 per cent. by volume below 120° C. It should be noted, however, that the "dry point" of a straight run product is usually below 120° C. giving a maximum boiling range of about 40° C. A product of these distillation characteristics will contain 10 to 25 per cent. of toluol which is valuable because of its high solvent properties. Motor benzol, used straight or mixed with petrol, is sometimes employed as a solvent, but otherwise its use is restricted to the motor industry.—Abstracted from *The Chemical Age*, Dec. 18, '37, p.491.

New Low Loss Molding Material

A new development of such striking character as to warrant the attention of not only regular plastics users, but also those to whom plastics have never seemed suitable, is a Bakelite plastic, called XMS-10023. This new resinoid, which is described as being a polystyrene molding material, unlike so many of its predecessors, retains an ability to be softened and distorted at higher temperatures.

It is moldable either by the older compression method or by the newer injection machines. Since it is a thermoplastic that requires no time under heat for polymerization, the molding cycle can be rapid.

Power and Loss Factor: It provides an insulation which makes possible more efficient current transmission, or less loss of current during transmission. This makes the difference between success and failure in circuits used in ultra-short-wave radio frequencies and television.

Dielectric Strength: A thinner wall of this material can be used to protect the conductors and prevent the electric current from arcing through. This, and its low specific gravity (or weight per unit volume) make possible lighter and less bulky insulation.

Chemical Resistance: Its chemical inertness makes it possible to extend its applications in the chemical field. It is unaffected by ordinary concentrations of both acids and alkalies. Since many types of insulation and instrument housings are subjected to acid fumes and alkalies, this property renders additional protection unnecessary.

Mechanical Properties: It is more resistant to shock than inorganic insulators which have comparable electric properties. This makes it capable of being used alone in thin sections, whereas many inorganic insulators must be used in heavy sections or be protected against shock. Its tensile and flexural strength are also above that observed in inorganic substances.

Color: In its pure state it is colorless and possesses a transparency approaching that of glass. It is not yet available for optical use or in various colors, due to the fact that it was initially produced to meet demands for electrical insulating and chemical resisting properties, but it is intended shortly to produce it in a full range of colors.

Hardness: Where a permanent finish is desired it can be used to advantage because of its hard surface. This means that knobs and housings will be more resistant to the abrasive effects of handling and flying particles for a longer period of time.

Weight: The low specific gravity, or weight per unit volume, of the material makes it possible to produce more molded pieces of the same size from a pound of molding material.

General Characteristics

Tensile Strength	5000 to 5500 lbs./sq. in.
Impact Strength	.16 to .2 ft. lbs.
Flexural Strength	7000 to 7500 lbs./sq. in.
Specific Gravity	1.05 to 1.07
Index of Refraction	1.60 to 1.67
Shrinkage	.002" to .003"/"
Heat Distortion (A.S.T.M.)	75° to 80°C. (167° to 176°F.)
Water Absorption	.05% 2½" disc after 318 hours complete immersion at Room Temp.
Rockwell Hardness	R-120 to 125
Modulus of Elasticity	.4 to .6 x 10^6 lbs./sq. in.
Coefficient of Linear Expansion	65 to 75 x 10^{-6}/°C.
Specific Heat	.306 Cal/gr/°C.
Transmission of Light	About 87%

Electrical Properties

60 *Cycles*	1000 *Cycles*	1,000,000 *Cycles*
Power Factor: .0001 to .0002	.0001 to .0002	Less than .0002
Dielectric Constant: 2.60	2.60	2.60
Loss Factor: .00026 to .00053	.00026 to .00053	Less than .00053
Dielectric Strength	(⅛" Step Method)	500 to 525 volt/mil
Resistivity		Over 10^8 megohms cms.

Arc Resistance (Proposed A.S.T.M. Method)—240 to 250 seconds

Solubility

Insoluble in:		
Alcohol	Acetone	"Cellosolve"
Soluble in:		
Styrene	Ethyl Acetate	Ethylene Chloride
Benzene	Carbon Tetra-chloride	"Cellosolve" Acetate
Toluene	Dioxane	Turpentine
Ethyl Benzene		

Steel Process

A new process for imposing alloy steel properties on certain grades of carbon steel so that the metal, though extremely hard, can be bent almost double was described at the science forum of the N. Y. Electrical Society by Edmund S. Davenport, metallurgist, U. S. Steel Corp. Process, which is nearing the stage of practical use, involves the quenching or cooling of steel in a bath of liquid substance other than water or oil.

Synthetic Fibres from Fish Meal

A pure protein fibre from fish meal is a reported development of Prof. Mecheels, Director, Research Institute for the Textile Industry, Munich-Gladbach, Germany. *Chemical Trade Journal*, Dec. 17, '37, p.550, states that fibres consisting of 80 per cent. cellulose and 20 per cent. fish protein are stated to have properties very similar to those of natural wool.

Seaweed to Produce Stronger Thread

It is reported in *Hide & Leather*, Dec. 25, '37, p.73, that a new laboratory is being opened in Rockland, Me., to carry on experiments in the use of kelp and seaweed products in the manufacture of a stronger thread. It is the belief that the addition of such products will not only make the threads more resistant to wear and water, but also less likely to part as they run through the machines.

Vegetable Oil for Paints

A new vegetable oil, known as Iguape Walnut Oil *(aleurites molucana)*, has been discovered *(National Paint Bulletin*, Dec., '37, p.8). Kernels yield 60 per cent. of a greenish yellow oil having an acid value of 2.8, and an iodine value of 160-162. When the oil is spread in a thin layer, the raw oil dries slowly, but after heating for four hours at 280°, it dries satisfactorily, and makes a more desirable paint vehicle than linseed oil. When the oil is mixed with jutahycica resin or kauri gum and heated to 340°, a quick drying varnish base is obtained.

Effective Dishwashing Mixture

The combination of sodium metaphosphate with sodium hypochlorite in dishwashing yields bacteriologically clean dishes in a greater percentage of cases than does hypochlorite used with soaps. Hall and Schwartz, *I. & E. C.*, Vol. 30, No. 1, p.23, explain that the difference is in the tendency of soap to form a scum which traps, and possibly protects, bacteria.

New Applications for Salt Cake

High grade salt cake of domestic and German origin is displacing more expensive Glauber's salt in the dyeing establishments of Verviers in the production of inferior qualities of woolen and cotton goods, according to a report from the American Commercial Attache, Brussels, Belgium.

Anthraquinone Process

Toyo Kagaku Kenkyujo (Oriental Chemical Research Institute) of Osaka is reported by American Commercial Attache, Tokyo, Japan, to have developed a process for production of anthraquinone from crude anthracene, securing carbazole as a by-product. This is stated to be the first successful effort to produce these chemicals in Japan; supplies have been imported in the past from Germany and the U. S.

Indoleacetic Acid Replaces Pollen

Strawberries and holly berries, as plump and firm as those naturally pollinated, have been produced at the U. S. Horticultural Field Sta., Beltsville, Md., by spraying blossoms with a chemical pollenizing agent composed of a four-one-hundredths solution of indoleacetic acid.

Etching Solutions

Four glass frosting materials for application to every kind of glassware are a new development of Westinghouse: 1. A glass etch solution, which produces permanent white markings on glass, is very fluid and can be applied with a rubber stamp. 2. A metal etch solution is for application by rubber stamp to brass, copper and silver. It produces a permanent and pleasing black finish, drying rapidly in the air without heat. 3. Acid glass frosting solution No. 2 is an etching material in paste form, producing a fine grained white satin frost on any type of glass in 10 to 15 seconds. 4. No. 1 safety frost solution for glass is also in paste form, and produces a finish similar to that produced by No. 2, but requires treatment of the glass for 5 or 6 minutes, to produce similar results. Being less corrosive, fewer precautions need to be taken in its use.

Use of Activated Alumina in Drying Air

In a recent paper to the A. C. S., R. B. Derr, Aluminum Company of America, described a new commercial process for removing water, necessary for controlling humidity in summer, based upon the adsorption of moisture by activated alumina. This material is a granular, porous, and inert solid which is capable of seizing substantially 100 per cent. of the moisture from a gas passed through it, until it has taken up 12 to 14 per cent. of its weight of water.

After use, the adsorbed water is removed by heating and, on cooling, it is again ready for repeated use. Thus, in suitable equipment, it is used to produce continuously air which will not deposit moisture at temperatures as low as 100° below zero F., and also of any intermediate moisture content as desired.

Metal May Change Power Transmission

Dr. C. W. Balke, chief research chemist, Fansteel Metallurgical Corp., in a recent talk before the A.C.S., said that the metal columbium may pave the way for cheaper and longer transmission of power. Because of its peculiar properties it can be employed in certain types of high-powered electronic tubes, which transform alternating current into pulsating direct currents.

Fireproof Paints

An efficient mixture for fire prevention in paints is composed of 45 parts powdered talc, 5.5 parts dextrin, 5.5 parts calcined gypsum, two parts calcium carbonate, two parts alum, and one part sodium chloride dissolved in water. A pigment may be added. Use of urea-formaldehyde resin is also possible in fireproof paints.—*National Paint Bulletin*, Dec., '37, p.8.

Hydrogen Zeolite

Separation of alkali metal carbonates from water has been possible heretofore only by distillation. Applebaum and Riley, *I. & E. C.*, Vol. 30, No. 1, p. 80, describe a new hydrogen zeolite which exchanges hydrogen for metallic ions, even those of sodium, and is especially useful where carbonates are involved.

Method Blueprinting Paper

Recent laboratory tests prove that the use of a mixture of 25 per cent. diethyl phthalate and 75 per cent. industrial alcohol will render ordinary paper sufficiently transparent for blueprinting, according to *Chemical Trade Journal*, Dec. 17, '37, p.550.

Month's New Dyes

Four new dyestuffs developed by du Pont will find application in the textile, printing ink and lacquer industries. Sulfogene Bordeaux 2RN is a bright blue textile color, which may be applied as a self-color but is more generally used in combination as a reddening and brightening element. Sulfogene Direct Blue 2RCF (patent applied for) gives bright, reddish shades of navy blue. It is a direct-dyeing, non-bronzing blue, suited to dyeing pieces in the jig. Lithosol Fast Yellow HL Powder is a lake color yielding bright medium shades of yellow, for use in printing inks, water paints, and lacquers. Lithosol Scarlet 2YL, designed for printing inks and lacquers, has a deep masstone and yellow tint, and, when used as a strontium toner, closely resembles Scarlet 2R for lakes in shade.

General Dyestuff has issued Fast Orange Salt GGD, fast color salt, yielding very fast and very bright orange shades with various naphthols. It is of interest in all fields of printing.

Pulp from Beech-wood

Experiments have proved that it is possible to digest beech-wood by means of bisulfite, which is in agreement with numerous publications on the subject. By altering conditions of boiling attempts have been made to produce pulp suitable for the manufacture of artificial silk and, also, pulp for paper-making. The boiling conditions were characterized by means of a penetration period of a considerable length as well as by the use of acid rich on SO_2. The yield on pulp was about 15 per cent. lower than that obtained from spruce-wood, the alpha cellulose content, however, being somewhat higher. Beech-wood pulps are distinguished by a low lignin content; they are of an easy bleaching property and have a high alpha cellulose content, but a low resin and ash content. The chemical data of bleached pulps suggested suitability as raw material for the manufacture of viscose. The values for tensile strength and bursting strength of beech-wood paper-pulp were lower than those of a soft bleached spruce-wood pulp. Folding endurance and tearing strength, according to Brecht-Imset, were found to be low particularly with low and medium degrees of wetness. It is probable that better strength properties may be obtained by different methods of digestion and by different beating conditions. The good absorbency of beech-wood pulp lends itself to the application as an additional fibre to the furnish of some special papers. Authors point out that the findings are based upon pure laboratory experiments and should, therefore, be taken to be not directly transferable to technical conditions. In actual practice, the converting of beech-wood into pulp is most likely to encounter difficulties before a correct technique can be established.—(H. Pfretschner, M. Gotz and E. Waidt, *Papier-Fabrikant*, 35, 27, 271-80, '37.)

Chemical Specialties for Industry

A digest of new uses and new compounds

Lime Salts in Textile Processing

By J. Wakelin

MOST dyers find lime the cause of trouble in the dyehouse and seek to avoid it wherever possible. The water supply, for example, may contain a little lime, and there are numerous occasions where this affects the color and fastness of the dyed material. Therefore, softening of the water prior to use is essential. But there is one field where lime may be a help rather than a nuisance; namely, in the dyeing of cellulose acetate rayon with dispersed dyes. This new discovery is applicable only in this particular case and does not apply to all fibers or to all dyes. It is found by the Societie Rhodiaseta of Paris, that when cellulose acetate is dyed with dispersions of insoluble dyestuffs, there is a tendency for so-called streaks and "dyeing creases" to make their appearance, which seriously detract from the value and perfection of the goods.

For example, a six kilo piece of cellulose acetate fabric is being dyed in the usual manner in a machine, the bath consisting of the following: 300 liters of water, 300 grams of olive oil soap together with 30 grams of dyestuff (1:4 amino-hydroxy-anthraquinone). The temperature is raised to about 75° C. and the fabric withdrawn after an hour, when it is found to be pink but shows the undesirable streaks and "creases" alluded to previously. This phenomenon is due to the materials being dyed in a crumpled condition.

Method of Overcoming Streaks

To obviate this defect, the inventors have found that it is sufficient if a quantity of inert, powdered substance is introduced into the dyebath and kept in movement meanwhile by a stream of air. The substance used must be colorless, non-abrasive, and of low density, so that it is reasonably free from tendency to sediment.

If the ratios and quantities of materials used in the foregoing dyeing process are retained, 3,000 grams of calcium sulfate should be added. To maintain the bath in agitation, a tube inlet on the base of the dyeing machine provides a supply of air. After the dyeing is continued for about 50 minutes at 75° C. under these conditions, the cellulose acetate acquires an even pink shade, free from streaks, and is fresher in appearance.

Considering the abundance of lime in water, it is curious that chemists have always sought to remove it therefrom, but never to utilize it. The Calico Printers Association has found that hard water is not always a bugbear, and may be applied to a useful purpose in finishing rayon and silk. Most known methods of taking the shine or lustre off silk consist of precipitating in them inert insoluble compounds of tin, zinc or titanium, and there are many varied practical processes for accomplishing this. The above inventors treat the material first with an aqueous solution of sodium or other soluble stannate, then follow by washing with water containing a small proportion of lime. At the second stage, the lime and tin mutually precipitate each other and give the weighting and matt finish. Viscose rayon, for example, is impregnated in a stannate liquor containing five parts of stannic oxide per thousand. The alkali is then removed, and precipitation accomplished by washing in a natural water having five parts of caustic lime per 100,000.

The resultant fabric is stated to have a beautiful matt finish and to have gained in weight.

Not only artificial silk, but also real silk, *e.g.*, Crepe de Chine, may be weighted and given a matt finish by this process. Since acid removes the delusterant substance, it is possible to utilize this fact in obtaining lustrous designs.

Crease-resistant Processes

Discovery that impregnation of cotton fabrics with urea-formaldehyde resins brings about a diminution in the tendency to creasing has brought about a minor revolution in the textile finishing industry. Whereas wool and animal fibers possess natural elasticity which makes them resist creasing in ordinary wear, cotton and rayon are very prone to suffer from this defect, a fact which researchers have long tried to remedy. Briefly, the method is along these lines: a simple urea-formaldehyde condensate is applied to the material and heat applied to polymerize and render the resin insoluble. At the same time, a catalytic substance, *e.g.*, an acid, must be present to facilitate the change. Unfortunately, the effect of heat-treating cellulose (either cotton or rayon) in contact with acids, brings about a reduction in the tensile strength, ultimately causing complete breakdown. Much research has been conducted with the aim of modifying the details of application, so that the polymerization is as little injurious as possible.

The original inventors of the resin impregnation process for inducing crease-resistance (Tootal, Broadhurst Lee) have since developed patents in which the use of acids was avoided as far as possible. In the following example, acid ammonium phosphate is used to insolubilize the resin. Commercial formaldehyde (40 per cent. solution) is neutralized and to 200 c.c.s of it are added 100 grams of urea. By adding tartaric acid the pH is adjusted to 4.5 and the solution may be diluted to give a liquid which is stable for several hours. After standing for a few hours, to every 100 c.c.s of liquor reckoned on the original full strength, two to three grams of ammonium dihydrogen phosphate are added.

With this solution a fabric is impregnated, squeezed, dried at a low temperature, and finally heated to 120° C. for two minutes to polymerize the resin and render it insoluble. The material is then washed and finished. It is stated that under the conditions of treatment the potentially acid phosphate substance liberates acid and brings about the transformation desired without the necessity of using strong acids.

It is easily seen that the foregoing method of condensing without acid is only a partial solution of the difficulty referred to earlier; namely, the undesirability of applying acids and heat to cotton. A much more satisfactory modification, which eliminates heating altogether, is disclosed in recent patents to Calico Printers Association, Ltd., who use calcium chloride solution. Use of a lime salt in this connection is an entirely new development which should interest both textile technologists and dealers in lime compounds.

By one process, use of urea may be dispensed with, the interaction of formaldehyde and cellulose being apparently sufficient

to cause crease-resistant qualities. A fabric composed of viscose rayon is immersed in a solution containing 200 grams of formaldehyde, 443 grams of calcium chloride and 100 grams of hydrochloric acid per liter for 15 minutes. It is then withdrawn; washed first with cold, then with hot water, and finally with boiling soap solution until all uncombined formaldehyde is removed. Material is then dried in the usual manner. It will be observed that in this process, although acid is used, the cloth is not subjected to high temperatures in contact with it; in fact, the acid present is well diluted when in contact with the cellulose. Thus, the use of calcium chloride effects a distinct improvement in the practical procedure. The inventors state that viscose treated as above exhibits a marked improvement in resistance to creasing, while the fabric also becomes relatively non-shrinkable.

In a still more recent patent, the same company reports that the calcium chloride process may conveniently be applied to the urea-formaldehyde type of condensation, when a creaseless finish is acquired without the use of any acid nor the application of heat. A small proportion of hydrochloric acid is used, but only indirectly, in conjunction with the lime salt. The impregnating liquor consists of a 16 per cent. (by weight) solution of dimethylol urea and two per cent. of 40 per cent. formaldehyde. A mercerized cotton fabric is immersed in this solution, which is quite neutral and contains no catalysts. The cloth is next lightly dried and padded in a cold 60 per cent. aqueous solution of calcium chloride containing 1.5 per cent. of hydrochloric acid (28 per cent.). The fabric is allowed to stand for about 15 minutes impregnated with the above, either in folds or wound on a roller and then washed. The first wash may be cold water made alkaline with ammonia, and the material is then soaped and dried. In place of the hydrochloric acid, acetic acid may be used. The risk of tendering the cloth with either acid is small since the acid is well diluted and is applied cold.

The fabric is stated to be markedly more resistant to creasing. There is no necessity for exactitude in the making up of the calcium solution.

Since the compound dimethylol urea has been mentioned, brief remarks about the preparation of this simple urea-formaldehyde condensation product are called for. 200 kilograms of 30 per cent. aqueous formaldehyde solution are made alkaline by adding 200 c.c.s of dilute aqueous ammonia, and the solution warmed to 30° C. Urea, 60 kilograms, is now added, with stirring, when heat starts to be evolved and the chemical reaction begins. To isolate the methylolurea, the liquid is now distilled under reduced pressure, some 48 liters of water being removed.

Wetting-out Agents

Two new wetting-out and penetrating agents of high efficiency and low cost are announced by Beacon Co., 89 Bickford St., Boston, Mass. Marketed under the name of Penatrols, they are adaptable to many industries where higher cost sulfonates are uneconomical. They are of particular interest to paper manufacturers, for removal of ink from old paper, impregnation of saturating papers, particularly latex-saturated papers, defiberizing of lap pulp, manufacture of absorbing paper toweling, etc., cleaning of felts, wetting out coating materials and increasing the rate of removal of water from the fibre on the Fourdrinier. Penatrols also find use in the manufacture of textiles, leather, metal cleaning and pickling compounds, agricultural sprays, etc.

Penatrol-60: The more efficient of the group compares very favorably with the standard higher cost materials in wetting-out and penetrating time, and has a great advantage in cost.

Penatrol-65: Lower in cost than Penatrol-60, is not quite as fast acting, but does a very satisfactory job in many applications.

Dry Cleaning Soap for Woolens

Dry cleaners will be interested in the new dry cleaning soap for woolens, known as "Woolz," just developed by Caled Products Co., Brentwood, Md. Product is said to clean faster and better with complete freedom from clarification difficulties.

Accelerator-Plasticizer

For use as an accelerator and chemical plasticizer of uncured rubber, O-X-A-F, the zinc salt of mercapto benzothiazole, is being manufactured by Naugatuck Chemical Division of U. S. Rubber Products, 1790 B'way, New York City. It is said to be non-discoloring, compatible with other accelerators, and adaptable to any type of compound and for any length of cure.

For Lubricating Rubber Parts

To fulfil a need created by increased use of rubber parts in machines, a composition for rubber lubrication, consisting of a combination of colloidal graphite, glycerin, and water, is now available. Product is applicable to rubber mechanical elements, such as those used in the spring shackles of automobiles, where a softening action accompanies the usual lubricating agents. —*India Rubber World,* Jan. 1, '38, p.76.

Non-poisonous Insecticide

An insecticide, said to be non-poisonous to humans and domestic animals, but deadly to insects which destroy crops, has been patented by Paul S. Schaffer and Herbert L. J. Haller of Washington, D. C., and dedicated to free use of the people of the U. S. It is prepared by reacting acetone with dibenyzylamine and is chemically known as dimethylacridan. When ground up into a powder or emulsified in a mineral oil, it may be applied by dusting or spraying on trees and other vegetation.

Corrosion-resistant Plastic

A corrosion-resistant plastic, Amercoat, can be sprayed on concrete, steel or wood with a paint-spray apparatus. Product is naturally colorless, but may be pigmented to any color or shade desired, and is manufactured by American Concrete & Steel Pipe Co., Box 1428, Arcade Sta., Los Angeles, Calif.

"Coal-soap"

Soap made from fatty acids produced by hydrocarbon oxidation is being produced in Germany. *Chemical Trade Journal,* Dec. 17, '37, p. 552, reports that in quality the "coal-soap" is fully equal to that of good natural soaps, and cost of production is said to be little higher than the processing of natural fat. Prospects of a rapid extension of production are considered very favorable.

Plastic Putty

A plastic compound to take the place of putty and other substances used for cementing glass to glass, metal, or wood, caulking crevices, making joints of various kinds, and other purposes, has been developed by Maas & Waldstein, Newark, N. J. "Plasticalk," as it is known, does not, like putty, dry, harden, crack, shrink, and lose its bond with age, but retains its plasticity and adhesiveness indefinitely. It also has the following properties: unaffected by water or humidity; does not support fungus-growth; easily applied with an ordinary putty knife, and, when in place, will not sag or flow, even if heated by a near-by electric lamp; adheres strongly to glass, metal, and wood, and seals made of it remain tight in spite of exposure to moisture and to wide variations in temperature. Many applications are possible, and it should be especially useful in the marine field and in construction of glass structures such as greenhouses and refrigerated show cases.

Cements for Mending Iron Parts

By Charles F. Mason, Ph.D.

A MISCONCEPTION, that any type of luting plaster or infusible cement would suffice for iron parts, existed into the last decade when much activity was manifested in Central Europe to meet the demand for mending iron parts in equipment, which was subjected to high and low temperatures.

Even though small heating units employing solid fuels have been and are still being replaced by large centrally located ones, which use liquid and gaseous fuels and in which fire clay and refractory cements are satisfactory in bolted joints, this condition has enhanced rather than decreased the demand for iron cements.

This may be attributed to the increased surface area of the heating equipment, which consists of radiators, covers and connecting lines. These cements are used to fill naturally occurring crevices or accidentally chipped parts and can only be considered as fillers, because their mechanical strength is not great.

The formulas listed below are classified with reference to composition rather than to physical characteristics which would be ambiguous. They are:

A. Metal oxides
B. Varnish binding
C. Sodium silicate
D. Molten metals

The mechanism of the binding action of classes B, C, and D is obvious to anyone, but that of Class A deserves some comment. In all cases, a finely divided metal, with or without a metallic oxide, is compounded with an acid or an acid or a salt, which upon contact with water produces either an acid or an alkali. The theory of the writer is that each particle of metal becomes coated with a layer of its salt which, although diluted with the metal oxide, acts as a binder. In other words, corrosion sets in and is promoted by the surrounding atmosphere and the temperatures to which the joints are subjected.

1.	Borax glass	5	For cast iron
	Silico manganese	85	
	Ferro silicon (15%)	10	
2.	Borax	4	For cast iron and alloy steel
	Rock salt	3	
	Manganese dioxide	7	
	Iron filings	14	
	Lime	36	
	Water	36	
3.	Iron filings	62	For refined cast iron, *e.g.*, wrought iron. Only to be used at low temperatures.
	Ammonium chloride	1	
	Water	37	
4.	Iron filings	14	For cast iron ovens
	Lime	14	
	Rock salt	14	
	Silica	14	
	Vinegar	44	
5.	Iron filings	25	For distilling apparatus, soap kettles and apparatus in general which contain fats and oils.
	Lime	25	
	Vinegar	50	
6.	Iron filings	98	For casting faults
	Sulfur	1	
	Ammonium chloride	1	
7.	Iron filings	92	Slow setting, two days at least
	Sulfur	3	
	Ammonium chloride	3	
	Sulfuric acid (10%)	2	
8.	Iron filings	29	Add water to putty consistency
	Sulfur	29	
	Ammonium chloride	1	
	Silica	25	
9.	Iron filings	98	Add water to putty consistency
	Ammonium chloride	1	
	Rock salt	1	
10.	Iron filings	50	For ovens
	Talc	25	
	Silica	13	
	Rock salt	12	
11.	Sulfur	25	For attaching iron to stone
	Iron filings	25	
	Silica	25	
	Vinegar	25	
12.	Iron filings	33	For iron boilers
	Iron vitriol	17	
	Vinegar	50	
13.	Red Lead	50	
	Linseed varnish	50	
14.	Litharge	21	For steam and hot water pipes
	Manganese dioxide	15	
	Graphite	21	
	Linseed varnish	43	
15.	Whiting	8	For steam and hot water pipes
	Ocher (yellow)	8	The coefficient of expansion of this compound is close to that of cast iron.
	Litharge	24	
	Manganese dioxide	6	
	Asbestos powder	3	
	Linseed varnish	51	
16.	Graphite	16	
	Litharge	16	
	Sulfur	10	
	Silica	6	
	Linseed varnish	52	
17.	Graphite	25	
	Chalk	13	
	Barytes	32	
	Linseed varnish	30	
18.	Iron filings		
	Manganese dioxide	6	
	Gypsum	15	
	Rock salt	5	
	Sodium silicate	50	
19.	Sulfur	50	This is melted and poured into the joint. Good in many cases for large flanged pipes.
	Graphite	50	
20.	Lead	75	Melted and poured into joints
	Antimony	16	
	Bismuth	9	

Formulas 2, 3, 4, 5, 6, 7, 11 and 12 of group A cannot be packaged in tin lined iron cans because corrosion and eventual leaking would result from the acid or alkali present. They must be packaged in glass containers or in tin ones, with instructions to add the solvent just before use. This is recommended in those containing the solvent, because after long standing upon store shelves they might set in the can.

Those of Group B which comprise formulas 13, 14, 15, 16, 17 can be shipped in tin or any metal container with tight fitting covers to avoid loss of varnish solvent by evaporation. They should be used in joints which are later to be subjected to direct heat, because in so doing the varnish film which acts as a binder would be destroyed with disintegration of the bond. A formula like 15 would deposit a very satisfactory bond after the varnish had been burned off, in case one is willing to suffer the inconvenience of fumes.

Only one example under class C is given because this group has been discussed in a separate article, and the highly alkaline nature of such cements renders them unsafe for home use. They should be placed only in the hands of factory workers who are familiar with their corrosive action.

Class D comprises only two formulas which must be melted before use and, in turn, should not be offered to the public for general use.

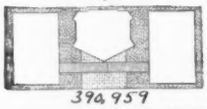
These preparations are offered to the public under trade names like Smooth-On and Rub-On. Those to which water is added just before use tend to resist the water, which is a temptation to add more than the required amount; but patience is the only necessary requisite to obtain a smooth working putty.

To date very few companies have produced these compounds, which makes it a promising field for the specialty producer who wishes to add another item to his wares.

384,716

LUSTRGILD
385,187

CROWN
385,679



394,959

OPACITONE
392,025

INCO
392,798

MULTI-FILM
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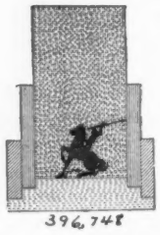
KA-BO
394,071

AUTO PORT
397,468

GLOPANE
397,569

395,933

LECTRO-KLEENER
396,661

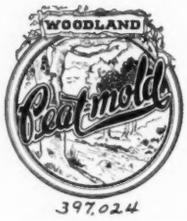


396,748

FLORISTELLA
397,340

Senegalin
396,878

HONOR
400,104



397,024

Barrett
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Conditionol
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BLUTEX
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Flite
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HYDRASOL
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THE HAPPY GARDENER
397,890

SPARITE
397,990

JAP-RO-CIDE
398,070

398,083

TORRIDEX
398,136

FLOOR-O-LEUM
398,217

PAROLITE
398,262

ZIMCO
398,372

DU-AL
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IGEPAL
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NITROSOL
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PHONE-GENE

398,306

398,347

MONCO
398,849

PARAWELD
398,364

Serolube
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Crusto
400,082

398,507

384,716. Reefer-Galler, Inc., New York City; Oct. 23, '36; insecticides, exterminators, repellents, deterrents, and preventives; use since Feb. 4, '36.

385,187. W. H. Kemp Co., New York City; Nov. 5, '36; gold paint; use since Oct. 23, '36.

385,679. Robinson Clay Products Co., Akron, O.; Nov. 18, '36; dry and plastic refractory high temperature cement; use since May 5, '33.

390,959. Hygienic Products Co., Canton, O.; Apr. 5, '37; laundry cleaner, bleacher and whitener, stain remover, etc.; use since Mar. 20, '37.

392,025. Glidden Co. (Chemical & Pigment Co.), Cleveland, O.; Apr. 29, '37; pigment and filler for paints, paper, rubber, etc.; use since Apr. 11, '30.

392,798. Inter-Coastal Paint Corp., E. St. Louis, Ill.; May 15, '37; rubber cement used as adhesive; use since Feb. 2, '37.

393,217. Hercules Glue Co., San Francisco, Calif.; May 25, '37; insecticidal compositions, spreaders for insecticides such as astringent lead arsenate; use since Apr. 15, '37.

394,071. Wilkey Labs., Inc., Chicago, Ill.; June 14, '37; shoe dressings, polishes, cleaners, shoe polish waxes and creams; use since Feb. 10, '14.

397,468. John Barnes, Milwaukee, Wis.; Sept. 16, '37; gasoline, lubricating oils and greases; use since Apr. 15, '37.

397,569. Bloomingdale Bros., New York City; Sept. 20, '37; window cleaning preparation; use since Aug. 6, '37.

395,833. Harriet A. Minor (H. A. Minor), Jeddo, Pa.; July 30, '37; deodorizer for refrigerators; use since July 20, '37.

396,661. Black & Decker Mfg. Co., Towson, Md.; Aug. 23, '37; solvent for cleaning fabric and automobile upholstery; use since Aug. 1, '37.

396,748. Pontiac Varnish Co., Pontiac, Mich.; Aug. 25, '37; paints and lacquers; use since July 20, '33.

397,340. Medici Hermanos, Montevideo, Uruguay; Sept. 11, '37; sulfur; use since July 8, '33.

396,878. Kantorowicz & Co., Breslau, Germany; Aug. 28, '37; glue; use since Sept. 9, '12.

400,104. Honorco, Inc., Chicago, Ill.; Nov. 24, '37; baking soda, cream tartar, and laundry bluing; use since Jan., '12.

397,024. Wm. J. Downey (Valley Road Co.), Danvers, Mass.; Sept. 2, '37; fertilizer compound; use since Feb. 15, '37.

† Trade-marks reproduced and described cover those appearing in the *U. S. Patent Gazettes*, middle week Dec. 21 through Jan. 18, inclusive.

397,173. Barrett Co., New York City; Sept. 7, '37; paper for building, sheathing and other construction purposes; use since 1893.

397,219. Maschinen & Apparate-Bauanstalt Hans Langen, Munchen-Gladbach, Germany; Sept. 8, '37; yarn wetting agents; use since July 14, '37.

396,793. Harold G. Valentine (H. G. Valentine Co.), Randolph, Mass.; Aug. 26, '37; cleaners for automobiles, metals, glass, leather and wood, having also polishing properties; use since May 1, '36.

399,937. John Opitz, Inc., Long Island City, N. Y.; Nov. 19, '37; insecticides and rodent poisons; use since Apr. 15, '37.

397,695. Witwer Grocery Co. (Blutex Bluing Co.), Cedar Rapids, Iowa; Sept. 22, '37; liquid bluing; use since Apr. 1, '37.

399,788. West Coast Kalsomine Co., Berkeley, Calif; Nov. 15, '37; powder and paste used in preparation paints; use since July 22, '37.

397,790. Bennett, Inc., Cambridge, Mass.; Sept. 25, '37; water-emulsifiable detergent or cleaning compound for degreasing and cleaning metal and machine parts, wooden and concrete floors, etc.; use since June 3, '37.

397,890. Wright Co., Phila., Pa.; Sept. 27, '37; fertilizers and artificial soil; use since June 1, '37.

397,990. Tri-State Development Corp., Burnsville, N. C., and Washington, D. C.; Sept. 30, '37; cleaning, scouring and polishing powders; use since May 25, '34.

398,070. Andrew Wilson, Inc., Springfield, N. J.; Oct. 2, '37; insecticide for Japanese beetles; use since July 18, '36.

398,083. Beck, Koller & Co., Detroit, Mich.; Oct. 4, '37; oils—processed and synthetic; use since Sept. 16, '37.

398,136. Warwick Chemical Co., West Warwick, R. I.; Oct. 4, '37; textile softening agent; use since Sept. 17, '37.

398,217. Sears, Roebuck & Co., Chicago, Ill.; Oct. 6, '37; linoleum paste and cement; use since July 24, '37.

398,262. Royce Chemical Co., Carlton Hill, N. J.; Oct. 7, '37; chemicals for discharge dyeings and discharge printing of textiles; use since Sept. 14, '37.

398,372. Salvo Chemical Corp., Rothschild, Wis.; Oct. 11, '37; vanillin; use since May 21, '37.

399,891. Healey Seaver Co., Boston, Mass.; Nov. 18, '37; adhesives having dextrin base; use since Aug. 16, '37.

397,707. General Dyestuff Corp., New York City; Sept. 23, '37; textile washing and scouring agents; also washing agents for bed feathers; use since June 22, '37.

400,553. Wm. Howard Jordan (Nitrosol Co.), Washington, D. C.; Dec. 7, '37; preparation for preventing rust and corrosion of metals; use since July 1, '33.

398,306. Florence R. Baroody (Baro Labs.), Buffalo, N. Y.; Oct. 9, '37; germicides for disinfecting telephones; use since Aug. 1, '37.

398,347. Sam Burkholder, Sedgwick, Kans.; Oct. 11, '37; paint; use since Dec. 1, '36.

399,849. H. A. Montgomery Co., Detroit, Mich.; Nov. 17, '37; cleaning compounds for removal grease and dirt from machinery and metal parts; use since Oct. 9, '37.

398,364. Menasha Products Co., Menasha, Wis.; Oct. 11, '37; thermoplastic compositions for films, coatings, etc., and also for heat sealing purposes; use since Sept. 16, '37.

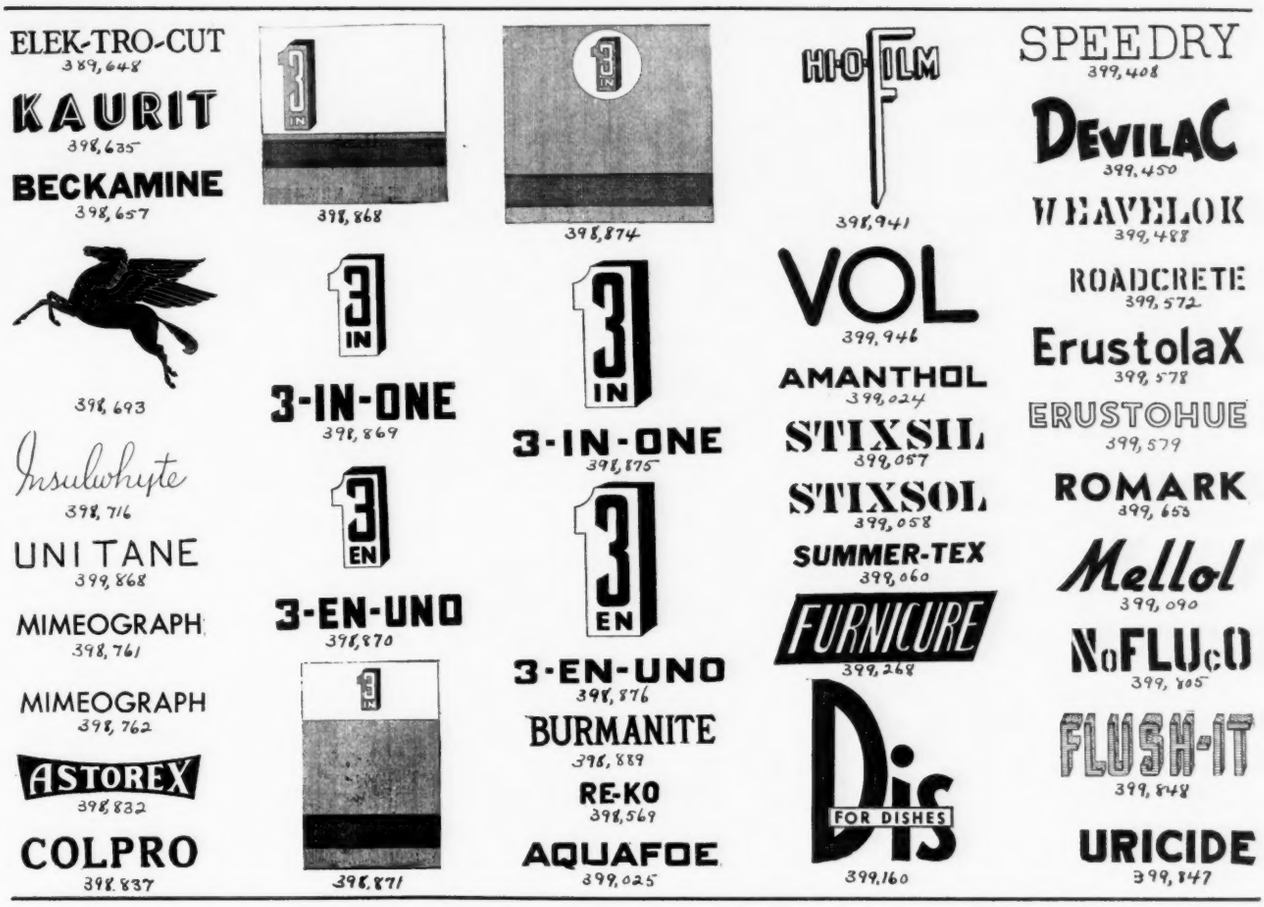
398,479. Friedrich Merz (Merz & Co.), Frankfort-am-Main, Germany; Oct. 14, '37; disinfectant, germicide, and antiseptic, also insecticide and food preservative; use since July 1, '37.

400,032. Sterling Products Co., Easton, Pa.; Nov. 22, '37; cleaning and stain removing agents for use in laundries and dry cleaning establishments; use since Mar. 5, '13.

398,507. M. Werk Co., St. Bernard, O.; Oct. 14, '37; household cleaning compound; use since Oct. 7, '37.

Coating Mix

An air- or heat-setting high fusion coating mix, described as Super Thermo-Stucco, has been developed by Chicago Fire Brick Co. It is for use in practically any kiln or furnace incorporating fire clay brick or plastic fire brick, including enameling furnaces, glass tanks (above glass line) and so forth. Applications can be made over any hot or cold fire clay surface by either troweling or spraying. After setting, it is claimed that the mix forms a firm bond that is air-tight and gas-tight.



389,648. Minnesota Mining & Mfg. Co., St. Paul, Minn.; Mar. 4, '37; abrasive cloth-paper-belts-sleeves-disks; use since Aug., '33.

398,635. Plaskon Co., Inc., Toledo, O.; Oct. 18, '37; resin glue adhesives; use since Mar. 17, '37.

398,657. Beck, Koller & Co., Detroit and Ferndale Sta., Detroit, Mich.; Oct. 19, '37; synthetic resin; use since Oct. 1, '37.

398,693. Socony Vacuum Oil Co., New York City; Oct. 19, '37; lubricating oils and petroleum engine fuels; use since June 15, '34, and Jan. 1, '33, respectively.

398,716. Walker T. Dickerson Co., Columbus, O.; Oct. 20, '37; heat transmission resisting compound for use as filler in shoe manufacture; use since Nov. 13, '36.

399,868. United Color & Pigment Co., Newark, N. J.; Nov. 17, '37; titanium pigments; use since Sept. 2, '37.

398,761. A. B. Dick Co., Chicago, Ill.; Oct. 21, '37; cement for mounting stencils and stencil sheets; use since July 24, '33.

398,762. A. B. Dick Co., Chicago, Ill.; Oct. 21, '37; photographic developer and photographic fixing materials for preparation stencils; use since May 27, '34.

398,832. Astor Exterminating Co., Boston, Mass.; Oct. 23, '37; insecticides, vermicides, rat poisons, and disinfectants; use since Mar. 24, '36.

398,837. Clarence M. Cobb, Boston, Mass.; Oct. 23, '37; laundry detergents; use since Sept. 17, '37.

398,868. A. S. Boyle Co., Jersey City, N. J.; Oct. 25, '37; oil adapted as lubricator, preserver, or cleanser for metal, wood or leather; use since Apr. 27, '37.

398,869. A. S. Boyle Co., Jersey City, N. J.; Oct. 25, '37; oil adapted for use as lubricant, preserver, and cleanser for metal, wood or leather; use since Aug., '33.

398,870. A. S. Boyle Co., Jersey City, N. J.; Oct. 25, '37; oil adapted for use as lubricant, preserver, or cleanser for wood, metal, or leather; use since May 19, '37.

398,871. A. S. Boyle Co., Jersey City, N. J.; Oct. 25, '37; furniture polish, wax preparations for cleaning, polishing, and protecting woodwork, floors, automobiles, etc.; use since Jan. 20, '37.

398,874. A. S. Boyle Co., Jersey City, N. J.; Oct. 25, '37; cleaning preparations for upholstery, rugs, woodwork, floors, silver, glass, etc.; use since Jan. 20, '37.

398,875. A. S. Boyle Co., Jersey City, N. J.; Oct. 25, '37; cleaning preparations for upholstery, rugs, woodwork, silver, glass, etc.; use since Jan. 20, '37.

398,876. A. S. Boyle Co., Jersey City, N. J.; Oct. 25, '37; cleaning preparations for upholstery, rugs, woodwork, silver, glass, etc.; use since July 9, '37.

398,889. Albert J. Burman, Kansas City, Mo.; Oct. 25, '37; all purpose cleansing powder; use since Oct. 10, '37.

398,569. Dye-Col Products, Inc., New York City; Oct. 16, '37; fungicides; use since Oct. 4, '37.

399,025. American Aniline Products, Inc.; New York City; Oct. 28, '37; waterproofing and repellent agents for textiles; use since Oct. 12, '37.

398,941. Southport Petroleum Co., Kilgore, Tex.; Oct. 25, '37; lubricating oil; use since Aug. 15, '37.

399,946. Volcocite Corp., Phila., Pa.; Nov. 19, '37; dry powdered cleaning material for enamel ware, silverware, glass, etc.; use since Apr., '37.

399,024. American Aniline Products, Inc., New York City; Oct. 28, '37; dyestuffs; use since Oct. 12, '37.

399,057. Phila. Quartz Co., Phila., Pa.; Oct. 28, '37; adhesive comprised of silicate of soda; use since Sept. 10, '37.

399,058. Phila. Quartz Co., Phila., Pa.; Oct. 28, '37; adhesive comprised of silicate of soda; use since Sept. 10, '37.

399,060. Sherwin-Williams Co., Cleveland, O.; Oct. 28, '37; insecticides and fungicides; use since Sept. 27, '37.

399,268. Church Aid Society, Meadville, Pa.; Nov. 3, '37; furniture polish; use since Oct. 25, '37.

399,160. V. C. Products Co., Phila., Pa.; Oct. 30, '37; soluble cleansing compound for emulsifying and saponifying grease; use since June 1, '36.

399,408. General Printing Ink Corp.; New York City; Nov. 6, '37; printing ink; use since Oct. 5, '37.

399,450. Jamestown Paint & Varnish Co., Jamestown, Pa.; Nov. 8, '37; rapid drying coating for wood, concrete or steel, which is highly resistant to alkalis, chemicals, and acids; use since Nov. 15, '36.

399,488. Warwick Chemical Co., West Warwick, R. I.; Nov. 8, '37; substances for after-treatment woven textiles to render them less liable to slip and fray; use since Aug. 4, '37.

399,572. Roadcrete, Inc., Newton, O.; Nov. 10, '37; road surfacing material; use since Sept. 15, '37.

399,578. Sterling Products Co., Easton, Pa.; Nov. 10, '37; pre-softening and cleaning agents for use in laundries; use since Jan., '32.

399,579. Sterling Products Co., Easton, Pa.; Nov. 10, '37; laundry preparation for souring and bluing in one operation; use since Aug., '33.

399,655. Glidden Co., Cleveland, O.; Nov. 12, '37; ready mixed paint; use since Feb. 1, '33.

399,090. Hercules Powder Co., Wilmington, Del.; Oct. 29, '37; oil base textile finishing agent; use since Aug. 17, '37.

399,805. New York & New Jersey Lubricant Co., New York City; Nov. 16, '37; lubricating oils and greases; use since Nov. 8, '37.

399,848. H. A. Montgomery Co., Detroit, Mich.; Nov. 17, '37; cleansing fluids, particularly for removal oils and grease; use since Oct. 27, '37.

399,847. Chas. M. Missler (Lightning Chemical Co.), Raynor Heights, Md.; Nov. 17, '37; toilet bowl cleaner; use since Feb. 15, '35.

Refractory Setter Tile

Users of kiln furniture will be interested in the new clay-silicon carbide setter tile, designated as "Carbo" 40, development of Carborundum Co., Niagara Falls, N. Y. Tile is recommended for use at cone nine or under, shows extreme resistance to rapid temperature changes, and does not require painting or washing.

Leather Belt Dressing

Nopco 1919, a leather belt dressing, developed by National Oil Products, Harrison, N. J., is said to contain no rosin, asphalt or similar belt gripping compounds, but is composed of oils which nourish and preserve the leather and keep it from drying up.

Creating Industries: 1918-38

Fifty Factual Reports on American Chemical Progress Since the World War by Fifty Distinguished Experts—

Published February, Vol. XLII, No. 2

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Dr. Louis C. Jones, *Nitrogen Engineering Corp.*

DRY CLEANING
E. R. Clark, *U. S. Hoffman Mach'y Co.*

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Dr. Frederick M. Becket, *Pres., Carbide & Carbon Research Labs.*

BRONZE, BRASS AND LIGHT-WEIGHT ALLOYS
Dr. Horace W. Gillett, *Director, Battelle Memorial Inst.*

INTERMEDIATES
John Weiss, *Weiss & Downs, Inc.*

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Dr. E. C. Williams, *Dir. Res., Shell Development Co.*

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Dr. Benjamin T. Brooks

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FLOTATION
Dr. Wilhelm Hirschkind, *Vice-Pres., Great Western Electrochemical Co.*

PAINTS LACQUERS AND VARNISHES
John Marshall, *Mgr., Fabrics & Finishes Dept., du Pont Co.*

INKS
Dr. Albert E. Gessler, *Dir. Res., Interchemical Co.*

PULP AND PAPER
Allen Abrams, *Tech. Dir., Marathon Paper Mills*

COATED AND IMPREGNATED FABRICS
A. E. Weith, *Bakelite Corp.*

TANSTUFFS AND TANNING
Dr. John A. Wilson, *Pres., Wilson Leather Co.*

CHINAWARE AND POTTERY
Dr. Edwin W. Tillotson, *Asst. Dir., Mellon Institute*

REFRIGERANTS
Crosby Field, *Pres., Flakice Co.*

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CHEMICAL SHIPPING
Harry M. Mabey, *Traffic Mgr., Mathieson Alkali Works*

CHEMICAL FINANCES
D. P. Morgan, *Scudder, Stevens & Clark*

In Preparation

Articles are being arranged for covering the following subjects:

HEAVY CHEMICALS — PLASTICIZERS — BIOLOGICAL CHEMICALS — METAL FINISHING
SOLVENTS — BROMINE — DRY COLORS — SYNTHETIC FIBRES
PHOSPHORIC ACID DERIVATIVES

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CHEMICAL INDUSTRIES, 149 Temple St., New Haven, Conn.

NEGOTIATES BRITISH TRADE PACT

Briefs May be Submitted Before Feb. 19—Public Hearings to Commence March 14—Trade Agreements Attacked at American Tariff League Convention—Hull also Announces Proposed Pact With Turkey—Mexico Announces Prohibitive Rises in Import Duties—

Secretary of State, Cordell Hull, closed in on his acknowledged major objective in his campaign for tariff bargaining last month with the announcement that negotiations with Great Britain are under way. From the inception of the idea of reciprocal trade agreements Mr. Hull has insisted that a pact with Great Britain was essential to the success of his plan.

The main list of articles on which the U. S. may grant import duty concessions was released by the State Department on Jan. 10 and a supplemental list was added on Jan. 24. More than 1,000 articles are included, including a wide variety of chemicals and raw materials.

Those interested may submit briefs prior to Feb. 19, and the Committee for Reciprocity Information will hold public hearings on the proposed agreement beginning Mar. 14. Sir Ronald Lindsay, British Ambassador to the U. S., and Arnold E. Overton, second secretary of the British Board of Trade will represent Great Britain in the negotiations.

Wide Scope of Proposed Pact

The agreement will include not only the United Kingdom but also Newfoundland, and the British Colonial Empire, which includes the Crown colonies, but not the dominions. While the U. S. export trade with the Crown colonies is small, several of them are important suppliers of raw materials for this country.

The State Department, in releasing the announcement, pointed out that not all the products listed will be the subject of negotiations, but articles not mentioned will not be considered, unless included in a supplemental list. In the group are a number of items already on the free list. Concessions on these could only take the form of agreements not to impose duties or import taxes on such articles during the life of the agreement. Dutiable articles may be the subject of duty cuts as high as 50 per cent. unless the rate has already been reduced by a tariff pact with another country. Concessions may also take the form of agreement against further increase or stipulations that only a certain quantity may be imported annually at the reduced rate.

Palm kernel oil, free of duty, but subject to an excise tax under the '34 Revenue Act, is included in articles subject to negotiation. The State Department indicates that it considers that it has authority to reduce such excise tax in a reciprocal trade agreement, even though the classification of such articles may meanwhile be changed by judicial decision or otherwise. The State Department has issued copies of both the original list (Jan. 10) and the supplemental list (Jan. 24). Interested parties may obtain copies by applying to Department at Washington.

Those in chemical circles view the proposed agreement with Great Britain as the most important from their particular viewpoint and the one that will have the greatest effect on the chemical business structure since the signing of the Swiss pact in January of last year (See C. I., Feb., '36, p. 185). This agreement was bitterly fought by the American dye industry. The late Francis P. Garvan, then president of the Chemical Foundation, also attacked the proposal with his characteristic vigor. Despite the fact that every administration from Wilson to Hoover had supported the policy of protection for American dyes, the agreement was completed by Mr. Hull.

Of course any concessions granted in the agreement with Great Britain will be automatically generalized to all other countries with which the U. S. has most-favored-nation agreements. Germany is now the only principal exporter to the U. S. that does not now fall into this category.

Monro, Tariff League Head Speaks

The inconsistency of negotiating new trade agreements during the present recession was attacked at the 53rd annual meeting of the American Tariff League by William L. Monro, of Pittsburgh, the League's president. Convention was held Jan. 20 in N. Y. City. Said President Monro:

"This recession has carried us into a loss of employment and business activity involving more people than have ever been engaged in production for export. In other words, problem of recovery is emphatically that of stimulating production and consumption of goods in our own markets."

Referring to list of products which will be considered for reductions in duty or binding of present tariff rates in the recently announced negotiations with the United Kingdom, Mr. Monro said:

"The scope of this list is so comprehensive as to make one wonder whether we are not perhaps involved in a general downward revision of the tariff. List of commodities which will be considered covers 209 paragraphs in the Tariff Act of 1930, 483 different rates of duty, over 800 separate statistical classifications of imports involving well over 1,000 separate commodities.

Possible Effects on Tariff

"Taken in connection with the concessions that have already been made in previous agreements, one cannot escape the conclusion that if this program is continued we will have the equivalent of a complete downward revision of the tariff by the time the State Department has completed negotiations with the principal countries of the world."

Proposed Agreement With Turkey

Secretary Hull announced, Jan. 11, intention to negotiate a trade agreement with Turkey. Interested persons were given until Feb. 9 to make application to be heard and to submit briefs, public hearings being scheduled to begin Feb. 23.

With the announcement, Secretary Hull released list of articles which will come under consideration for the possible granting of concessions. Of special interest to chemical and allied fields are:

Commodity	Present rate of duty
Valonia extract, not containing alcohol	15%
Borax, crude or unmanufactured, and borate of lime, borate of soda, and other borate material, crude and unmanufactured, not specially provided for	Free
Chromite or chrome ore	Free
Valonia, whether crude or advanced in value or condition by shredding, grinding, chipping, crushing, or any other similar process, not containing alcohol	Free
Emery Ore	Free

Mexico's Prohibitive Increases

Our Southerly neighbor, Mexico, dropped the proverbial "monkey wrench" in the "good neighbor" movement in the middle of January when it ordered greatly increased duties on a large number of products, including many chemicals and allied materials exported from the U. S. The Mexican decree was dated Dec. 31, but was not published until Jan. 19. New duties are to remain in effect until April 30, after which they are to be decreased, but only to a level generally in excess of the rates formerly in force. The official announcement of the Mexican Government states that the increases were placed in effect to establish a better balance between exports and imports, and not for the purpose of increasing revenues.

"Golden Rule Policy"

"Our interpretation of the Golden Rule policy towards industry," reports Gov. Richard W. Leche of Louisiana, "is that if Louisiana takes care of industry, then industry will take care of Louisiana." Backing up his statement the governor disclosed new plant investments totaling $47,000,000 including the following: Standard Oil Co. of N. J., with a $7,000,000 construction program; International Paper & Power, $6,000,000 to $12,000,000; du Pont, $3,000,000; Allied Chemical & Dye, $1,000,000; Mathieson Alkali, $815,000; Shell Union, $750,000; Freeport Sulphur, $310,000; Swift & Co., $300,000; Continental Oil, $300,000; U. S. Industrial Alcohol, $190,000; and Continental Can, $160,000.

260 Toast Eaton-Clark

Chemical industry paid tribute to the one hundred years' service rendered by the well-known distributing firm of Eaton-Clark Company, Detroit, at a banquet, Jan. 14, at the Hotel Statler. Among the 260 present were, Howard P. Mansfield, Dr. E. A. Rykenboer, Milton Kutz, C. L. Wiswall and A. C. Stepan of du Pont; Leland Doan and R. L. Curtis of Dow; N. E. Bartlett and Harry Potts of Penn. Salt; Alfred Lichtenstein and Arthur Brainerd of Ciba; L. W. Miller and Cass Cislo of Barrett; George M. Dunning, Michigan Alkali; J. A. Hyland, Pacific Coast Borax; Otto Raschke, Victor; W. B. Carter, N. Y. Color and Chemical; E. A. Johnson and S. B. Cottrell, National Aniline; L. L. Griffiths, Jr., Calco; William C. Van Arman, Johns-Manville; T. E. Waters and John S. Grant of Procter & Gamble; Charles F. Young, Davies-Young; L. D. Linke, Carbide & Carbon Chemicals; Fred H. Harris, Solvay; Emerson Davis, Detroit Chemical; Carter Robinson and H. M. Flagg of J. B. Ford Company.

Berrien C. Eaton, the grandson of the founder and president of the company, acted as toastmaster. Speakers of the evening were Rev. Merton S. Rice and Williams Haynes, publisher of CHEMICAL INDUSTRIES.

Dinner to Heckel, March 11

George B. Heckel, secretary of the Federation of Paint and Varnish Production Clubs, and one of the most beloved and well-known men in the industry, will be honored at a dinner at the Waldorf-Astoria, N. Y. City, on March 11, in recognition of his completion of 50 years in the paint field. His 80th birthday occurs March 13. George A. Martin, president of Sherwin-Williams, will preside at the dinner.

Du Pont Sues Author

The du Pont Co. took the first step in a $150,000 libel action against Ferdinand Lundberg, author of "America's 60 Families," and against its publishers, The Vanguard Press, when notice of suit was given on Jan. 6 in the Federal Court in N. Y. City by William H. Button, N. Y. attorney.

Statements made in the book, which has been used by Ickes and others in attacks on American industry, form the basis of the company's suit. Said Lammot du Pont, in discussing the action, "There is not a word of truth that the du Pont Co. billed the government $75 for the burial of every worker who died at the Old Hickory Powder Plant and sold the bodies for $11 as well." He specifically denied a number of other sensational charges made in the book.

New I. C. C. Dangerous Article Rulings

Three Chemicals Added to Dangerous List—Forbids Packaging of Chlorates in Wooden Barrels or Kegs—Approves Construction of 139 Fusion-Welded Tankcars for Experimental Purposes—Considers New Drum Regulations—

The I.C.C. on Jan. 20 announced a number of changes in the regulations for the transportation of dangerous articles. Of importance to the chemical field were: Three new chemicals added to the dangerous articles list—calcium chlorite, nickel carbonyl, and sodium chlorite; wet trinitroresorcinol (styphnic acid) deleted from the list.

Also sodium and potassium chlorates may not be shipped in wooden barrels or kegs after Nov. 7, 1938.

Order makes a number of changes in shipping container specifications. Drum 5C when made of stainless steel for the shipment of nitric acid may be two gauges lighter than the steel required from drum 5A. Drum 5G is required to be made of a special nickel-chrome alloy, this replaces a former specification which required that whatever metal used be able to stand a nitric acid test lasting one month. Wooden barrel 22A, used for shipping dry chemicals, may be closed with a 28-gauge steel push-in closure in place of a nailed-in wooden plug if desired. A number of other technical changes in packaging and shipping regulations were contained in the order.

The I. C. C. on Jan. 10 granted authority for construction for experimental service in the transportation of explosives and other dangerous articles of 139 tankcars fabricated by fusion-welding. Applicants for the authority were the General American Transportation, duPont, American Car & Foundry, and Union Tank Car. Cars are to be used for transportation of caustic soda solution, nitric acid, anhydrous ammonia, and petroleum products.

The Commission is also considering proposals of the Manufacturing Chemists Association to make certain changes in the specifications for steel drums for interstate shipment of dangerous liquids, following hearings before an examiner of the Bureau of Safety.

One proposal is that a welded closure be required for the I. C. C. 5 drum, a returnable drum used for liquids flashing below 80°. This has been opposed by American Flange & Manufacturing, which seeks to have the specification retain permission for use of a pressed-in closure. Briefs in the matter were received up to Feb. 7.

Another proposal made by the M. C. A. was that an I. C. C. 5-E non-returnable drum with an 18-gauge head and 20-gauge bodywalls be authorized for use for industrial alcohols and solvents.

COMING EVENTS

FEBRUARY

14-15. American Institute of Mining & Metallurgical Engineers. Waldorf-Astoria, N. Y. C., John T. Brennich, 29 W. 39th st., N. Y. City.

15-17. Federal Wholesale Druggists Associations. Mid-year meeting, N. Y. City, Hotel Roosevelt, R. E. Lee Williamson, 123 Market pl., Baltimore, Md.

17-18. American Petroleum Institute, Division of Production. Spring meeting, Mid-Continent Div., Amarillo, Tex., Hotel Herring, Lacey Walker, 50 W. 50th st., N. Y. City.

21-24. American Paper and Pulp Association. Waldorf-Astoria, N. Y. City, Charles W. Boyce, 122 E. 42nd st., N. Y. City.

21-24. Technical Association Pulp & Paper Industry, Waldorf-Astoria, N. Y. City, R. G. MacDonald, 122 E. 42nd st., N. Y. City.

24. Pittsburgh Award (A.C.S.). Pittsburgh, Pa.

25-26. American Physical Society, N. Y. City. Columbia University.

25. American Pulpwood Association. Waldorf-Astoria, N. Y. City, William P. Good, 220 E. 42nd st., N. Y. City.

MARCH

7-12. American Society for Testing Materials. Spring Regional meeting, Rochester, N. Y., Hotel Seneca, C. C. Warwick, 260 S. Broad st., Philadelphia, Pa.

9-11. American Society of Tool Engineers. Exhibit and Convention, Convention Hall, Detroit, A. F. Denham, 5928 2nd blvd., Detroit, Mich.

10-11. N. J. Sewage Works Association. Trenton, Hotel Stacy-Trent, P. N. Daniels, 56 Maple ave., Trenton, N. J.

11. Wm. H. Nichols Medal Award. N. Y. City, Chemists' Club.

13. Dinner, Drug, Chemical & Allied Trades Section, N. Y. Board of Trade. Waldorf-Astoria, Ray Schlotterer, 41 Park Row N. Y. City.

16-18. American Association of Petroleum Geologists. New Orleans, Hotel Roosevelt.

21-22. The Liquefied Petroleum Gas Association, St. Louis. F. R. Fetherston, 11 W. 42nd st., N. Y. City.

22-25. Eighth Packaging Exposition. Chicago, Palmer House.

23-25. American Society of Mechanical Engineers, Los Angeles, Calif.

24-25. American Petroleum Institute, Div. of Production. Spring meeting, Southwestern District, Fort Worth, Tex., Hotel Blackstone.

27-April 1. American Ceramic Society. New Orleans, Hotel Roosevelt, Ross C. Purdy, 2525 N. High st., Columbus, Ohio.

30-April 2. American Society of Biological Chemists. Baltimore, Hotel Baltimore.

Du Pont Plant Destroyed

Seven explosions, one minute apart, completely wrecked du Pont's synthetic rubber plant at Deepwater, N. J., on Jan. 23. The series of terrific blasts were heard 30 miles away and brought a flood of inquiries pouring into Philadelphia papers and police stations. Windows were smashed in the nearby towns of Gibbsboro, Pennsgrove, Pennsville, Central Park and other South Jersey communities.

First explosion occurred at 3:21 a. m. and the series culminated with the thunderous detonation of two 10,000-lb. tanks of acetylene 8 minutes later. Two were killed, one other is given an even chance of recovering from second-degree burns. Loss is estimated at $100,000. Company is conducting an exhaustive inquiry to learn the cause. In the meantime, preliminary plans are being laid for erection of a new plant.

Compressed Gas Association Celebrates

25th Convention Attracts Record Attendance—Higher Freight Rates in Sight—Plastics Symposium to be Held by A. S. T. M., March 9—Baekeland to Receive Messel Medal—

The Compressed Gas Manufacturers Association 25th annual convention, held at the Waldorf-Astoria, N. Y. City, on Jan. 17 and 18, attracted a record attendance. Convention was preceded by a series of technical committee meetings, but officially opened with a luncheon on Jan. 17. The entire day, Jan. 18, was devoted to presentation of a series of papers covering, among others, the following:

"Explosive Ranges of Flammable Liquids," by F. C. Mitchell, du Pont.

"The Liquefied Petroleum Gas Industry." (a) Its Birth and Earliest Days, by A. N. Kerr, Imperial Gas Co.; (b) Progress and Development, by M. G. Farrar, Carbide & Carbon Chemicals Corp.; (c) As to the Future of the Industry, by R. W. Thomas, Phillips Petroleum.

"The Anhydrous Ammonia Industry," by E. Rowland, of Henry Bower Chemical Mfg. Co.

"The Sulfur Dioxide and Methyl Chloride Industries," by H. V. Higley, Ansul Chemical Co.

"The Medicinal Gas Industry—Selection and Use of Compressed Gases for Dental and Surgical Anesthesia," by Dr. H. M. Seldin.

"The Chlorine Industry," by Robert T. Baldwin, The Chlorine Institute.

"The Oxy-Acetylene Industry," by E. A. Doyle, The Linde Air Products Co.

"A Review of the Transportation of Compressed Gases," by Harry M. Mabey, Mathieson Alkali Works, Inc.

"A Review of the Association's Work on Technical Problems Affecting Transportation and Storage Equipment," Dr. C. E. MacQuigg, Dean of the School of Engineering, Ohio State University.

The speaker at the Tuesday luncheon was Herbert Wilson Smith who delivered a very excellent talk on general business conditions. 25th Annual Banquet fittingly terminated the Silver Anniversary Celebration of the Association. John Motley Morehead, former U. S. Minister to Sweden was the toastmaster and addresses were delivered by Judge Isaac Melson Meekins, District Judge of the U. S. Court, and E. M. Allen, president, Mathieson Alkali Works, Inc. Mme. Gertrude Wettergren, a member of the Metropolitan Opera Co., entertained with vocal selections. About 300 members of the industry were present at the banquet, including a large delegation of Canadian manufacturers.

The new officers are: President, John J. Crowe, Air Reduction; vice-president, P. F. Lavedan, Liquid Carbonic; vice-president, F. C. Zeisberg, du Pont; secretary, treasurer, F. R. Fetherston.

Higher Freight Rates Likely

Truckers, whose internal bickering forced abandonment of an earlier plan to seek freight rate increases simultaneously with the railroads, have filed an informal rate increase notice with the I.C.C., it was disclosed in Washington on Jan. 11. Truckers were encouraged by recent I.C.C. decision which stopped an Eastern group from undercutting rates established by the Middle Atlantic States Motor Carrier Conference. The I.C.C. ruling prevented, it is said, a motor truck rate war. In dealing summarily with the rate cutting truckers, the I.C.C. went further than any Federal regulatory body has yet gone in fixing prices, holding in effect that the recalcitrant group of 100 truckers could charge no less than the rates established by the majority in that area.

The emergency rate committee of the American Truckers Association has asked the I.C.C. to take a short cut, to dispense with hearings on truckers' rates and to give to the truckers the same rate increase as will be accorded the railroads and to make them effective at the same time.

Authoritative traffic executives, who have been closely following ex parte 123 proceedings before the I.C.C., estimate the railroads will receive a 10% increase in freight rates. Decision is now expected between Feb. 15 and 20.

F.T.C. Cites Chlorine Makers

Nine chlorine manufacturers are charged in a complaint issued by the Federal Trade Commission with engaging in a combination and conspiracy which has resulted in their fixing and maintaining uniform enhanced prices for their product, in violation of Section 5 of the F.T.C. Act. Companies mentioned in the complaint are: Mathieson, Electro Bleaching Gas; Solvay; Hooker Electrochemical; Columbia Alkali; Diamond; Belle Alkali; Monsanto; and Penn Salt Manufacturing.

For the purpose of eliminating price competition among themselves, respondent companies, in '31, complaint charges, entered into a combination under which they agreed to fix and maintain, and have fixed and maintained, uniform enhanced prices for liquid chlorine. It is further alleged that the respondent companies have divided the U. S. into zones in which, by agreement, they have effectuated their price-fixing program.

Williams Haynes, publisher CHEMICAL INDUSTRIES, and William M. Vermilye, vice-president National City Bank and formerly president, National Aniline, spoke January 13 at the winter meeting of the Newcomen Society, at the Union League Club, New York City, on the parts played by chemicals and power in the Industrial Revolution.

Plastics Symposium

The 1938 regional meeting of the American Society for Testing Materials will be featured by a symposium on plastics, at Rochester, N. Y., March 9. Some 100 various meetings will be held during the week, March 7 to 11. Papers will be read by the following plastics authorities: A. F. Randolph, du Pont; H. M. Richardson, G. E.; W. A. Zinzow, Bakelite; L. A. Meyer, Tennessee Eastman; J. C. Pitzer, Formica Insulation, and G. M. Kline, National Bureau of Standards.

S.-W. Appoints Van Stone

Dr. N. E. Van Stone is the new Director of Manufacturing Operations for Sherwin-Williams. He goes to Cleveland from Chicago where he has made a brilliant record as head of the Company's lacquer research and manufacturing, and has also been elected vice-president of company.

William H. Barry, for the past 5 years assistant manager of the chemical division of the Brown Co., is now manager.

Announcement has been made from London that Dr. Leo H. Baekeland has been elected to receive the Messel Medal for '38. This medal is awarded by the Society of Chemical Industry every two years for outstanding achievement in science.

Priorities, house organ of the Prior Chemical Corp., 420 Lexington ave., N. Y. City, in its January issue reviews the rubber industry, and the February number surveys the plastics field. Copies are available.

Obituaries

Robert J. Keller, 77, retired importer of dyestuffs and former president of Geigy, died on Jan. 13 after a lingering illness.

Charles Frederick Kelly, 62, a director of Technical Equipment Corp., N. Y. City, on Dec. 31. He was widely known in chemical circles. At one time he was sales manager for Ralph L. Fuller & Co., later became Monsanto's sales manager, and in '20 became associated with Dr. Max Muller in Rhodia Chemical. When Rhodia was taken over by Newport he remained for a time, and then with Dr. Muller formed Technical Equipment.

Herbert R. Browne, 67, technical director of Michigan Alkali, on Jan. 19, following an abdominal operation. He was born in Manchester, England, came to America as a youth, and became the first chemist employed by Michigan Alkali which was then in its infancy. After being with Michigan for several years he joined Mathieson Alkali's staff at Saltville, Va., but returned to the former company after 4 years.

News of the Specialties

Foreign Demand for U. S. Printing Inks Revealed

Dept. of Commerce Releases Study of Foreign Markets—Bureau of Standards Submits Revision of Simplified Practice Recommendation R41, Covering Packaging of Agricultural Insecticides—Beacon Acquires Hobart—Other News of the Specialties Field—

Pyrethrum Crop Poor

Importers report that quality of the '37 pyrethrum crop received so far from Japan is the poorest in nearly 50 years. Color in many instances is off, and pyrethrin content is low. Bad weather conditions are blamed. Total crop is off, totalling about 10,000 tons, as against 11,127 in '36, and 12,753 in '35. A reduction of 15% occurred in '37 acreage. Sino-Japanese situation has created greater need for food crops at the expense of pyrethrum. Imports into the U. S., however, of pyrethrum flowers, crude, during the first 11 months of 1937 totaled 17,947,196 lbs., a quantity in excess of receipts for any earlier year.

In Season in '38

Business executives are finding it increasingly necessary to watch the various state legislatures to detect introduction of discriminatory legislative bills (72,000 legislative bills of all kinds were introduced into Congress and state legislatures in '37). Following are the states which in '38 meet in regular session on the dates indicated, also duration of the sessions:

Ky.—Reg. Session meets Jan. 4	60 days
La.—Reg. Session meets May 9	60 days
Mass.—Meets annually	Unlimited
Miss.—Reg. Session meets Jan. 4	Unlimited
N. J.—Meets annually	Unlimited
N. Y.—Meets annually	Unlimited
R. I.—Reg. Session meets Jan. 4	60 days
S. C.—Reg. Session meets Jan. 11	Unlimited
Va.—Reg. Session meets Jan. 12	60 days

Trade Commission Activities

A complaint has been issued by the Commission charging 8 companies and their trade association, Pyrotechnic Industries, Inc., Investment Building, Washington, D. C., with entering into agreements and engaging in a conspiracy to fix and maintain uniform prices and discounts in the sale of fireworks.

Double B Products, 58 Putnam st., Hartford, Conn., floor waxes, enters into a stipulation to discontinue certain misleading representations in the sale of its product.

Prentiss Expands

R. J. Prentiss & Co., 100 Gold st., N. Y. City, acquires pyrethrum and insecticide division of Sherwood Petroleum of Brooklyn. Prentiss organization is an important factor in pyrethrum. Purchase brings William F. Kroneman to the Prentiss organization. He was with Sherwood for 12 years and has had 25 years of experience in technical and sales problems of the insecticide field.

American printing inks, because of their high quality and adaptability to all classes of work, enjoy world-wide reputation, according to "Foreign Graphic Arts Industries," a 382 page study embracing all branches of the printing art, just released by the Bureau of Foreign and Domestic Commerce. Exports of American printing inks, valued at close to one million dollars, went forward to 67 different foreign countries in '36, report reveals.

China, as has been the case in recent years, was the largest purchaser, taking 20% of the total amount of printing inks exported from the U. S. during '36. Cuba stood second, followed in order by the United Kingdom, Mexico, Chile, Canada, Philippine Islands, Uruguay and Peru. All of these countries, with the single exception of Canada, purchased more printing ink from the U. S. in 1936 than they did during the preceding year.

Latin America is particularly inviting as an export field for printing inks, according to the Commerce Dept's. study, which points out that with the exception of Argentina, Brazil, and Chile, printing inks are not manufactured in South America.

The Near East, Far East, and certain areas of Oceania and Africa also offer excellent opportunities for the sale of printing inks, as consumption in these areas has made notable gains in recent years. Various types of printing inks are manufactured in Australia, British India, China, Netherlands India, Turkey, and New Zealand, but with the exception of Australia and Japan, domestic production offers little competition to imported products. Although most European countries are largely self-sufficient insofar as their printing ink requirements are concerned, there are possibilities for extending sales of high-quality inks and raw materials for the manufacture of such products in many of the areas.

Copies of the report, Foreign Graphic Arts Industries, Trade Promotion Series No. 172, may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., or through any office of the Bureau of Foreign and Domestic Commerce. Price 35c.

Package Revision

Standing committee in charge of Simplified Practice Recommendation R41, covering sizes of packages of agricultural insecticides and fungicides, has approved a revision of the recommendation, and the Division of Simplified Practice of the National Bureau of Standards has submitted copies of it to manufacturers, distributors, users and others interested for consideration and acceptance.

Original recommendation, which became effective May 1, '26, established a simplified list of standard package sizes for arsenate of lead, calcium arsenate, Paris green, and Bordeaux mixture. Proposed revision concerns not only sizes of packages, but also types of packages, as well as number of packages per shipping container. Geographical area, to the needs of which each size and type of package is particularly adapted, is also given.

Copies of proposed revision may be obtained from the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

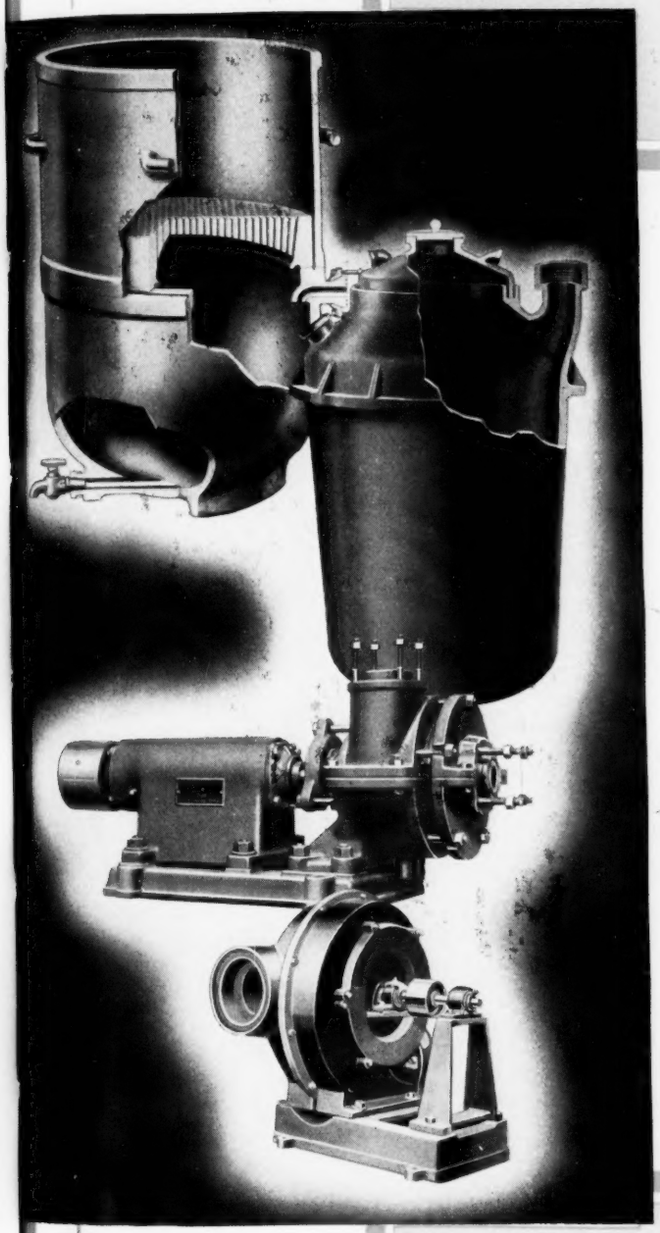
Name Award Split

After considering 735 names submitted by 333 contestants, committee for the "Name Contest," picked to select the best name to replace the present generally used word "exterminator," was of the unanimous opinion that none of the names submitted had greater possibilities for a true and effective substitute for the word exterminator. It was believed by the committee that the title "Pest Control Operator" which was not submitted has greater possibilities. One contestant, Dr. H. O. Deay of Purdue, suggested the initials P. C. O. and for this reason was awarded one-half of the $50 award offered by John Opitz, Inc., N. Y. City, while the other half was donated to Purdue. It was immediately announced by Dr. E. C. Elliott of Purdue that the $25 would form the nucleus of a fund to be known as the "Pest Control Operator's Fund"—a revolving student aid loan account. Individuals attending the banquet at the Pest Control Operator's Conference made additional contributions so that the amount is now $150.

Offers Consulting Service

The Carolina Analytical Laboratories have been established at Charlotte, N. C., and will furnish analytical, research and consulting service to the textile and other industries in the Southern states. The laboratories, which are located at 2316 S. Boulevard, are equipped with the most modern devices for rendering a complete chemical and chemical engineering service. Carolina Analytical Laboratories is a subsidiary of the Carolina Aniline & Extract Co., Charlotte, manufacturers of specialties, and dealers and importers of chemicals for the textile trade.

A standard solution . . . for special processing problems



Whatever your processing problems . . . exhausting corrosive gases, refining precious metals, storing strong acids, or blending cosmetics . . . they can be met, effectively and economically, through the use of General Ceramics Chemical Stoneware.

Built in a wide range of types, shapes and sizes in a complete line including tanks, coils, pipe, fittings, and mechanical equipment, General Ceramics Chemical Stoneware meets every requirement of the process industries.

Because General Ceramics Acid-Proof Chemical Stoneware defies corrosion, it is impervious to and can be used for any chemical, hot or cold (excepting only hydrofluoric acid), without danger of product contamination.

Write for complete information on this durable ware . . . or send a summary of your particular problem. There is no obligation or cost, and the data received may show you how to solve a special processing problem or to reduce operation and maintenance costs.

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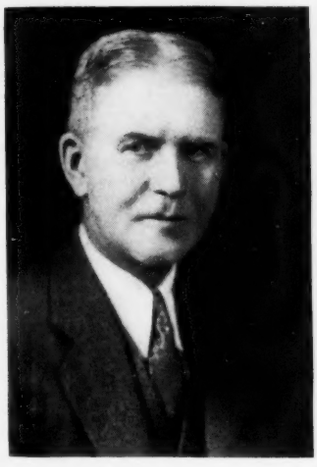
Montreal: 1009 University Tower

PRIOR CHEMICAL CORP.

NEW YORK, N.Y.

SELLING AGENTS

Shop employees of the Pangborn Corporation (blast cleaning and dust control equipment), Hagerstown, Md., grouped together at Christmas and presented Thomas W. Pangborn, president, John C. Pangborn, vice-president, and George S. Goodrich, general superintendent, with individual baskets of poinsettia and silver pledges of loyalty and affection in the shape of loving cup, water pitcher and service tray, respectively. Left to right, Chas. B. Spigler, Leonard Shank, Geo. Green, Russell Miller, Vernon Stouffer, Geo. S. Goodrich, Thos. W. Pangborn, John C. Pangborn, Thos. Poffenberger, Ira L. McKee, Thos. Allen and G. LeRoy Piper.

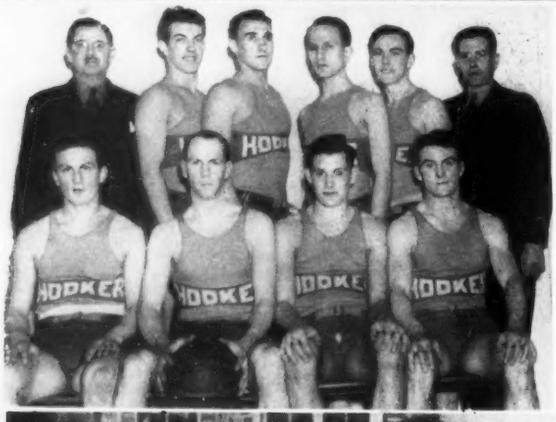


American Institute Gold Medal for 1938 goes to Dr. William Crocker, Director of Boyce Thompson Institute for Plant Research.

The youthful mother of Warner's "Neuberg boys," Lou and Fred, celebrated her birthday at a little dinner at the Chemists' Club in New York City on Thursday, December 9th.

Employees of Tennessee Copper Company's Railway Department, Copperhill, Tenn., celebrate two years' non-accident record.

"Winter Sports" in Chemical Circles



Bowling and basket-ball teams representing chemical companies play nightly all over the country in city leagues for industrial championships. Basket-ball is a hot spot of enthusiasm at Niagara Falls where teams represent Hooker, Carbide & Carbon Chemicals, Isco and other plants; while at Charleston, W. Va., bowling is the winter headliner, and the Westvaco Bowling Club, shown above, is one of the largest, most enthusiastic uniformed organizations of its kind in America.

The Monsanto Players are getting to be a St. Louis institution as famous as the Hasty Pudding Club in Boston, or the Comedy Club in New York. This year's musical comedy, "Good News," had two performances in December, under the stage direction of Paul N. Bizen, analytical chemist at the St. Louis plant and president of the organization. The other officers are Hulda Hall, vice-president; William Hempelmann, business manager; Billie Diebold, secretary; Jaunita Plate, assistant secretary.

YOUR COPY IS WAITING FOR YOU!

EVERY RESEARCH CHEMIST . . . every chemical engineer interested in developing new processes, improving existing methods, or reducing production costs . . . will want a copy of this new Sharples booklet. Its 64 pages contain detailed information, properties and specifications on 96 Sharples Synthetic Organic Chemicals, including semi-commercial and laboratory products.

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Normal Butyl Carbinol
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Methyl Propyl Carbinol
Diethyl Carbinol
Dimethyl Ethyl Carbinol
Tertiary Amyl Alcohol
*Pentaphen
(p-Tertiary Amyl Phenol)
Diamyl Phenol
Ortho Amyl Phenol
Monoamylamine
Diamylamine
Triamylamine
n-Monobutylamine
n-Dibutylamine
n-Tributylamine
Monoamyl Naphthalene
Diamyl Naphthalene
Polyamyl Naphthalenes
Mixed Amyl Naphthalenes
Normal Amyl Chloride
Normal Butyl Chloride
Mixed Amyl Chlorides
Dichloropentanes
Amyl Mercaptan
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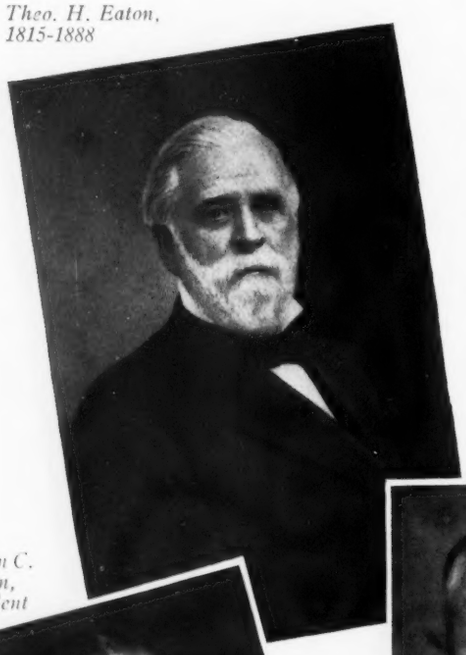
THE SHARPLES SOLVENTS CORP., 23rd and Westmoreland Sts., Philadelphia, Pennsylvania

Eaton-Clark Company Celebrates Centennial

Having served an apprenticeship with William Williams & Company, chemical merchants and wholesale druggists of Buffalo, Theodore H. Eaton, one hundred years ago, bought out the drug firm of Reilly & Ackerly in Detroit. For four years the business was continued under the management of David A. McNair, but in 1842 Mr. Eaton moved his family to Detroit and assumed active control which held till his death in 1888. Under his management the business gradually centered more and more upon industrial chemical supplies, specializing in dyestuffs, more lately in dry cleaning chemicals, and materials for the coatings and automotive industries.

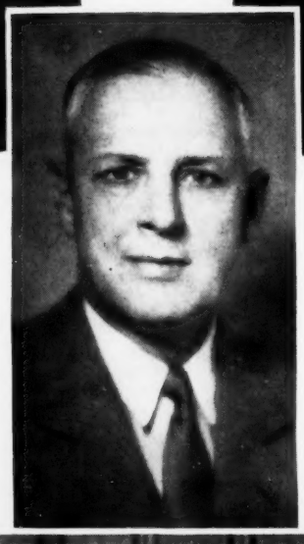
Son and namesake of the founder, Theodore H. Eaton, Jr., became partner in 1866, under the style of Theo. H. Eaton & Son. In 1890 B. F. Geiger was admitted to partnership, and after Mr. Eaton's death in 1910 the company was incorporated as the Eaton-Clark Co. and his nephew, Rufus W. Clark, who joined the staff in 1899, became president and so served till 1920 when he was elected Chairman of the Board. Grandson of the founder, Berrien C. Eaton, now president, served in the A. E. F. during the World War and shortly after his return from France was elected President. Richard C. Hedke joined Eaton-Clark in 1907 as a salesman, was Secretary 1918-20, and since then Vice-President and General Manager. January 14th this firm celebrated its one-hundredth birthday (see News Section).

Theo. H. Eaton, 1815-1888

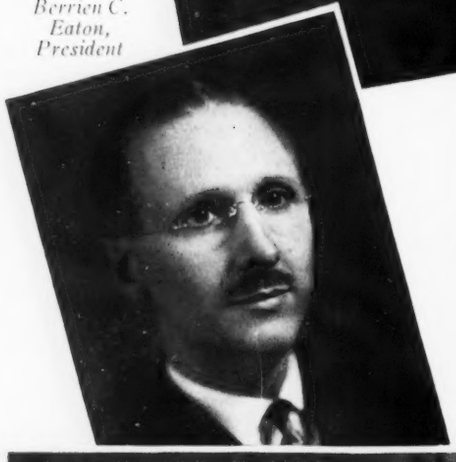


Theo. H. Eaton, Jr., 1842-1910

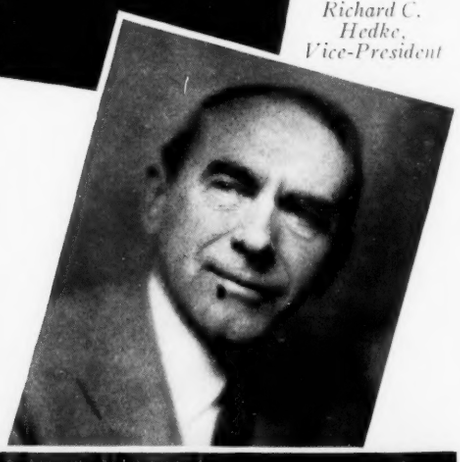
Rufus W. Clark, Chairman of the Board

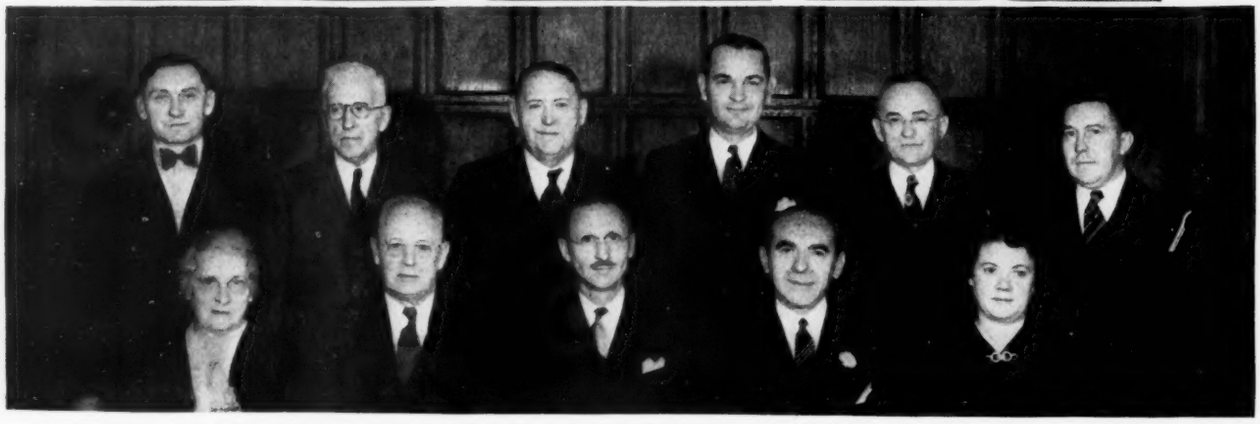


Berrien C. Eaton, President

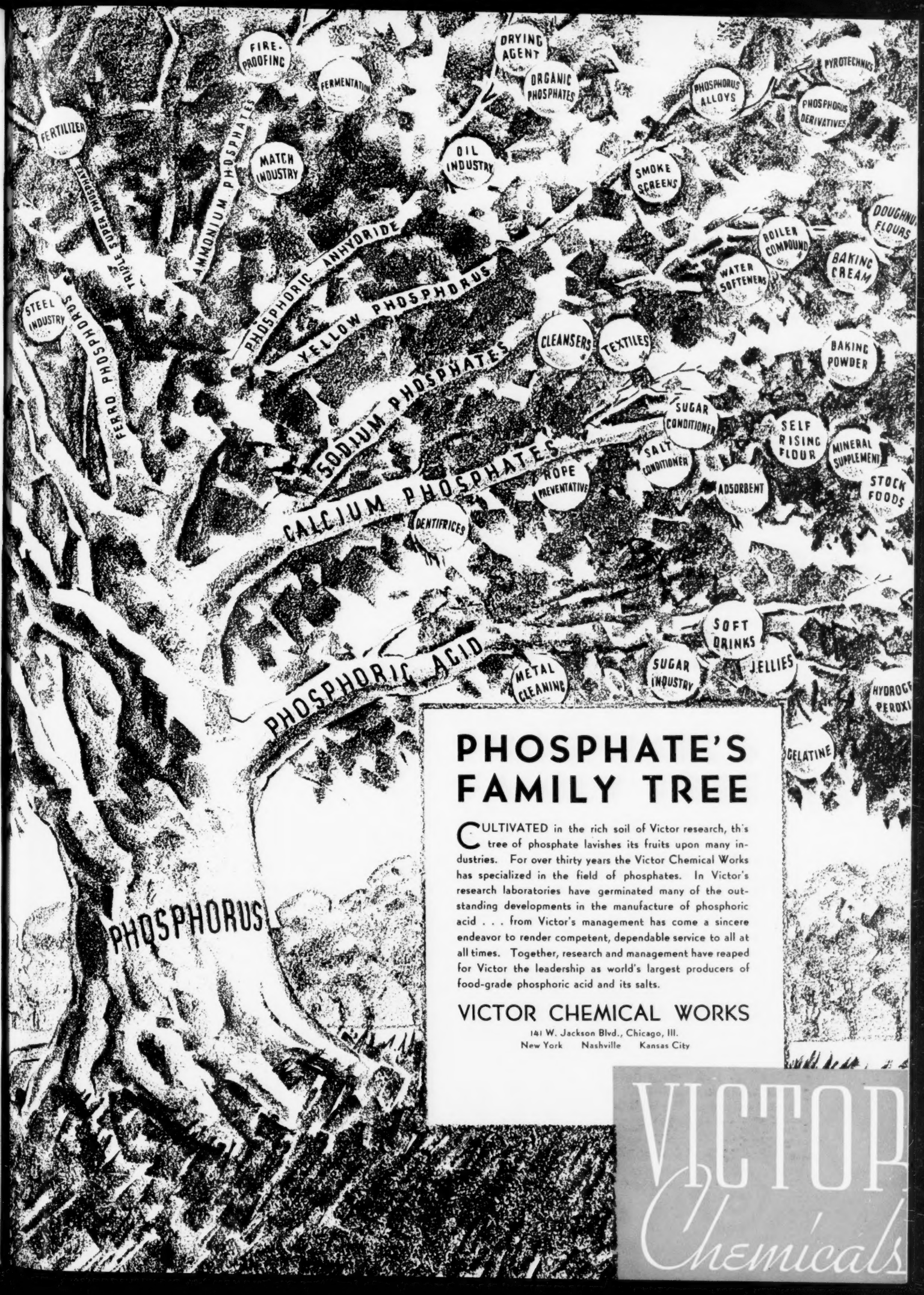


Richard C. Hedke, Vice-President





Group of employees who have been with the company twenty years or more. Seated, left to right, Clara N. Lund, Rufus W. Clark, Berrien C. Eaton, Richard C. Hedke, Charlotte Tessens. Standing, Joseph M. Orlick, Wm. O. Emery, Peter Schlaf, Gerald T. McCray, Albert Walz, Benjamin G. Hansen. David J. Emig, with company 25 years, was prevented by illness from being in picture.



PHOSPHATE'S FAMILY TREE

CULTIVATED in the rich soil of Victor research, th's tree of phosphate lavishes its fruits upon many industries. For over thirty years the Victor Chemical Works has specialized in the field of phosphates. In Victor's research laboratories have germinated many of the outstanding developments in the manufacture of phosphoric acid . . . from Victor's management has come a sincere endeavor to render competent, dependable service to all at all times. Together, research and management have reaped for Victor the leadership as world's largest producers of food-grade phosphoric acid and its salts.

VICTOR CHEMICAL WORKS

141 W. Jackson Blvd., Chicago, Ill.
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VICTOR Chemicals

Let a Test Run Convince You

That STANDARDIZED ALUMINUM STEARATES CUT PRODUCTION WASTES

Courtesy of Valentine Co., Makers of Valspar

Test Them in Your Plant at Slight Cost

Test the behavior of these new Aluminum Stearates in your experimental laboratory with your own formulas and raw materials. Five pounds of each of the three grades (M, D, and T) will be sent you prepaid for $3.50. Take advantage of this generous trial offer without delay. Send the coupon below and see how easily and accurately the acid-base ratio can be adjusted to your varying requirements.

Mallinckrodt Aluminum Stearates are made to specifications for the Paint, Varnish, Lubricant, Waterproofing, and similar industries.

SPECIAL OFFER! 5 Pounds of Each Grade (M, D, and T, for $3.50)

LET THIS COUPON BE YOUR ORDER

MALLINCKRODT CHEMICAL WORKS
St. Louis, Missouri 72 Gold Street, New York, N. Y.
(Address nearest office)

Send me your $3.50 Special Offer of trial quantities of the new standardized Aluminum Stearates (5 pounds of each of the three grades—M, D, and T).

Name .....

Street .....

City ..... State C.I.-2

(See Special Offer below)

You can cut production wastes by standardizing your paint, varnish, lubricant, and waterproofing formulas with Mallinckrodt Standardized Aluminum Stearates. Research has shown that the acid-base ratio is the prime factor governing the behavior of Aluminum Stearates with various oils and solvents. The three new Mallinckrodt grades (mono-, di-, and tri-acid) can be mixed in any proportion to get the desired ratio of acid to base.

Aluminum Stearate Technical M (mono-acid) — Produces soft greases. Small quantities produce a *definite* flatting effect in varnishes with less tendency to jell formation.

Aluminum Stearate Technical D (di-acid) — This is the standard industrial grade most widely used for paints, varnishes, lubricants, and waterproofing materials. Stearate investigations logically start with this grade. M and T grades may be added as modifying agents. A small quantity of the M grade will tend to make greases harder, while the T grade will reduce the tendency to graininess, brittleness, and bleeding in greases and oils.

Aluminum Stearate Technical T (tri-acid) — With most oils and solvents this grade can be dispersed in higher concentrations than either the D or M grades and will cause less jelling in certain formulas. It is recommended as a flatting agent and for certain types of waterproofing material.

These are definite chemical compounds of highest quality, not trade-marked or patented mixtures. They are manufactured to rigid chemical standards, assuring you uniform results. You can standardize your formulas for greater convenience and economy.

Two Other Aluminum Stearates

Aluminum Stearate Technical Fluffy is chemically similar to the D grade, but slightly finer and bulkier.

Flatting Agent No. 22 will cause less jelling in certain varnishes than the other grades.

Other Mallinckrodt Stearates for Industrial Use

Calcium Stearates
Technical
Impalpably Powdered

Magnesium Stearate
Impalpably Powdered

Sodium Stearate
Technical

Zinc Stearate
U.S.P. XI

St. Louis
Chicago
Philadelphia

Mallinckrodt
CHEMICAL WORKS

New York
Montreal
Toronto

13th ANNUAL TRADE DINNER this year is to be held at the Waldorf-Astoria on Thursday, March 3, under the auspices of the Drug, Chemical and Allied Trades Section of the New York Board of Trade. Be sure to come.

Beacon Acquires Hobart

The Beacon Co., 89 Bickford st., Boston, purchases M. M. Hobart & Co., manufacturer of specialty oils for leather, textiles, and general industrial use and will operate the new acquisition as the Hobart Specialty Division of the Beacon Co. Information on two new products recently developed by Beacon as low-cost substitutes for sulfonated alcohols will be found in "The New Chemicals for Industry" section of this issue.

Cincinnati Soap Merged

Hewitt Soap (founded 1884) with factory and general offices at Dayton, Ohio, completes merging of Cincinnati Soap (founded 1863) into its own organization. N. Y. office of Cincinnati Soap has been moved into those of Hewitt Soap at 47 W. 34th st., where Martin F. Schultes, vice-president of that organization, has maintained offices for over 16 years. Mr. Schultes will continue to have entire charge and supervision of the Toilet Soap Division of the combined companies.

Laucks Expands in L. A.

Constantly increasing volume of sales for Laux Products has resulted in the opening of a new, enlarged plant in Los Angeles where manufacturing, sales and service operations for I. F. Laucks, Inc. for California and the Southwest will hereafter be centered. Company had previously been located at 2456 Enterprise st. for a number of years. New plant is located at 859 E. 60th st. Company produces synthetic resins, paints, etc. Other factories of I. F. Laucks, Inc. are located in Seattle, Vancouver, B. C., Lockport, N. Y., and Portsmouth, Va.

Snell on Detergents

Foster Dee Snell addressed the Baltimore Section of the A. C. S. on Jan. 25 on the subject "Some Factors in Detergency." In his talk Dr. Snell outlined the 4 known factors and presented evidence to indicate that only those factors control the efficiency of a detergent. This was then applied to many types to illustrate variation in the relative importance of different factors in the cases of toilet soaps, laundry detergents, scrub soaps, wetting out agents, etc.

New Locations

Rollo Manufacturing, makers of stucco and colored products, moves from Cleveland to Danbury, Ohio. . . The Industrial Fumigant Co. moves to Sykes Warehouses, 931 W. 19th st., Chicago.

New Insecticide Marketed

Kessler Chemical is offering a new series of aromatic isothiocyanate insecticides. At present only the alphanaphthyl isothiocyanate is being marketed under the trade name "Kesscocide 95." It is particularly recommended on household insects.

Advertising Programs

P. & G. starts new contests for Ivory Soap and Oxydol. Ten Studebaker cars, with 1,000 gals. of Texaco gasoline and Philco radios, are the chief prizes in the Ivory Soap contest and 10 $100 bills in the Oxydol contest . . . The traditional Valspar trade-mark of boiling water being poured on a varnished table top will shortly have a companion picture of a painter mixing colors, and the dual identification will be featured in the expanded advertising campaign for '38 . . . Merck is preparing expanded advertising plans for Di-chloricide (moth killer).

Prentiss Issues Booklet

R. J. Prentiss & Co., 100 Gold st., N. Y. City, is distributing copies of a booklet "Modification of the Peet-Grady Test and New Ratings for Liquid Household Insecticides."

Nopco Staff Meeting

Two Carbide & Carbon Chemicals Corp. executives were the speakers at the January Nopco (National Oil Products, Harrison, N. J.) staff meeting. H. D. Hughes described the historical background of Carbide and related several of the problems involved in the manufacture and sale of bulk materials. H. B. McClure then gave a brief informal talk on the recent development of a number of interesting chemicals made by his company and provided the audience of 80 with a number of practical demonstrations of the new uses for the products reviewed. Meeting was held at the Newark Athletic Club, Jan. 31. Logan Grupelli, of National Oil Products, is chairman of the arrangement committee for the monthly gatherings.

Specialty Co. News

The Alkydol Laboratories, recently formed at 526 W. 18th st., Chicago, to manufacture synthetic resins and special oils, elects Dr. Adolph Heck as president, and M. R. Gillette, formerly in charge of the Chicago offices of Cook Paint & Varnish, as secretary.

Baldwin Laboratories is introducing a new shoe cleaner member, Dwin White, to its Dwin family.

Brock Chemical, Abington, Mass., is a new firm supplying chemical specialties used in shoe manufacturing.

"Finishes engineered to the job" were exhibited by Maas & Waldstein Co., makers of industrial finishes, Newark, N. J., at the International Heating and Ventilating Exposition, held in N. Y. City in January.

Hanson-Van Winkle-Munning, manufacturer and distributor of electroplating equipment and supplies, completes a new office building at Matawan, N. J., as one step in a comprehensive program of expansion.

News of the Specialties

Moore Joins Little

Dr. Ralph G. D. Moore joins Arthur D. Little, Inc., to conduct research planned under the Drycleaning Fellowship provided by the Institute for Maintaining Drycleaning Standards.

Dr. Moore obtained his doctorate in '36 at McGill, and has just terminated a post-doctorate fellowship at the same university investigating soap-phenol-water systems and their possible connection with the action of certain detergents in the purification of rayon wood pulp. His researches in dry cleaning solvents and detergents will be conducted under the supervision of the Arthur D. Little, Inc., organization and with the cooperation of a research committee composed of several authorities outside the Arthur D. Little, Inc., research staff.

Personal and Personnel

D. J. Strickler, authority on insecticides, joins the S. B. Penick & Co. staff, agricultural division. He will conduct eastern field experiments on the new non-toxic insecticides being marketed by the company.

John E. Haggenmacher resigns as vice-president of Warwick Chemical, West Warwick, R. I.

James T. Eaton, formerly with National Aniline, is now with E. F. Houghton & Co., Philadelphia.

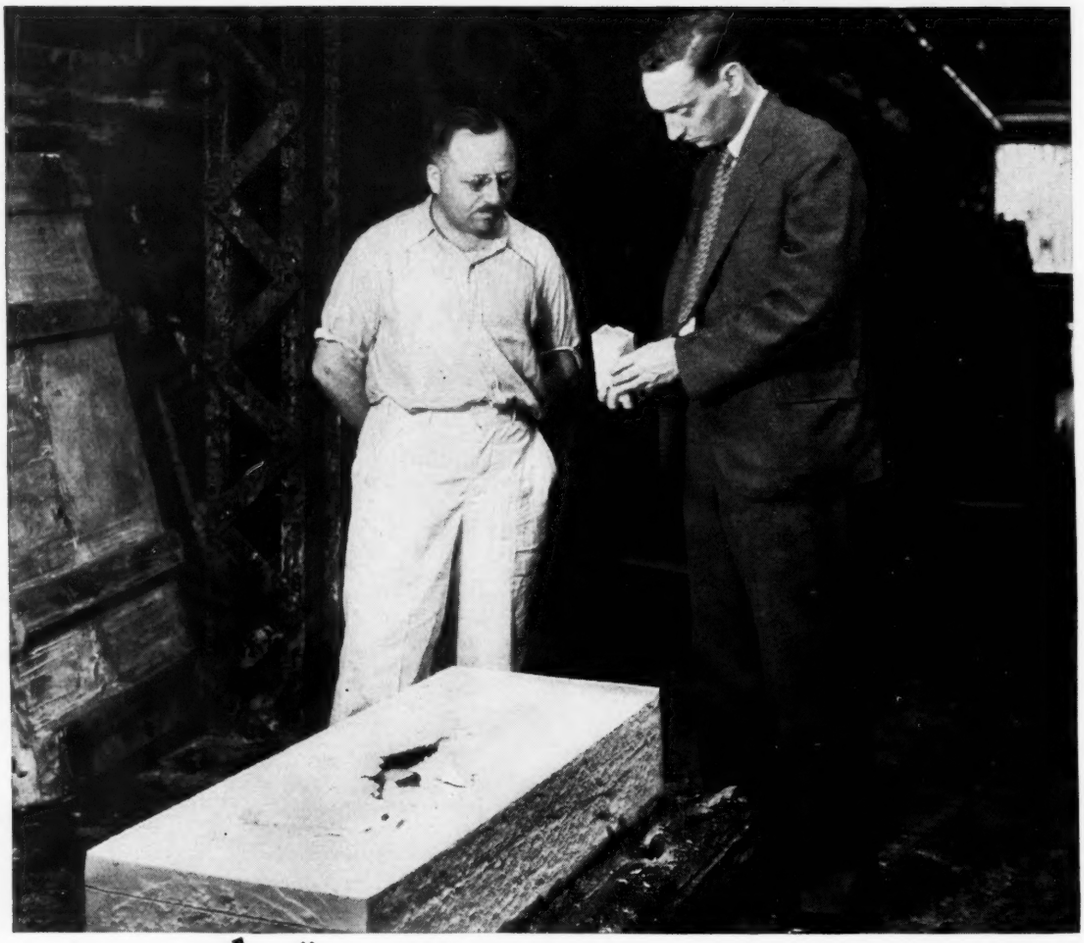
William O. Buettner, secretary of the National Pest Control Association, has just finished a nation-wide inspection trip. He reports that a West Coast conference, similar to the annual Purdue Pest Control Operators Conference, will be held on the Coast in March.

Deaths in the Specialty Field

Oliver Cabana, Jr., 72, president of Liquid Veneer, Buffalo, on Jan. 21. He had been ill more than a year. Twenty years ago Mr. Cabana took his life savings of $500 and started the Buffalo Specialty Co., which is now Liquid Veneer. He was very prominent in Democratic political circles. . . . Dr. William McKay Bruce, 63, chief chemist for Permutit, on Jan. 20. He had been with the company for 15 years. . . William C. Hopkins, 55, secretary of the H. V. Walker Co., Elizabeth, N. J., manufacturer of nitrocellulose products, on Jan. 9.

William B. Yudizky, 74, president, A.H.Y. Color & Chemical, on Dec. 30 after an illness of 7 weeks . . . Edwin F. Cathcart, 46, vice-president, Arco Co. (lacquers), on Dec. 17. He introduced commercial pyroxylin lacquer into Europe for du Pont; later established Glidden's lacquer division.

P.Q. SILICATE SERVICE for YOUR PROBLEM



*In a soap plant, P.Q. Service man investigating a "coffin". A "coffin" is an opening which sometimes appears in the frame of soap during cooling. It may be empty or may have a layer of liquid.

A "COFFIN"*

P.Q. SILICATE Service is the kind that rubs elbows when working with you on a technical problem.

Our research men have the background of many years' experience in dealing with silicates for a variety of uses. In fact, our experience with silicates began over seventy-five years ago. This plus the widest selection of silicates of soda available assure you of a dependable helpful service.

Try P.Q. when you need silicates of soda.

33 BRANDS
meet your need for:

Adhesive	Emulsifier
Deflocculent	Coating
Colloid	Cement
Detergent	Size
Flocculent	Inhibitor
Binder	Gel

EST. 1831

PHILADELPHIA QUARTZ CO.

General Offices and Laboratory: 125 South 3rd Street, Philadelphia. Chicago Sales Office: Engineering Building, 205 West Wacker Drive.

Works: Anderson, Ind., Baltimore, Md., Chester, Pa., Buffalo, N. Y., Kansas City, Kans., Rahway, N. J., St. Louis, Mo., Utica, Ill. Stocks in 60 cities.

P. Q. SILICATES OF SODA

Heavy Chemicals In Slightly Better Demand

Seasonal Improvement in Tonnages Reported, But Buyers Are Still Adhering to "Hand-to-mouth" Purchasing—Copper Salts Reduced—Sodium Nitrite Off ¼c—Metasilicate Advanced 5c—Bichromates Firm—Diamond Celebrates 25th Anniversary—

A moderate degree of seasonal improvement has taken place in the demand for industrial chemicals in pace with the slightly better rate of manufacturing activity in the principal chemical consuming industries, but buyers are still mindful of inventories and are holding rather strictly to a hand-to-mouth purchasing policy. Excellent headway was made in January in closing up contracts that were hanging fire because of the uncertainties in the business situation.

Copper had its "ups and downs" last month and finally closed out the month at 10c. Both black and red copper oxides moved up and then down in line with the red metal, but the net result in each case was a loss with the black oxide quoted at 14¼c in large quantities and the red oxide at 16¼c. Copper sulfate declined to a basis of $4.25 in carlots, despite the fact that demand is excellent and producers are really short of material. The monohydrated grade was reduced ¼c, also, to 9c in large tonnages. Weakness in antimony metal was the reason for sharp declines in antimony oxide and sodium antimoniate. An easier tone in tin forced a lower market for tin tetrachloride and sodium stannate. A new schedule is in effect on anhydrous ferric chloride as follows:

	390 lb. drum	150 lb. drum
Carlots	$4.65	$5.00
Less-carlots (more than 1 ton)	5.25	5.60
Less-carlots (1 ton or less)	6.25	6.60

Rather unexpected was a ¼c reduction in the carlot quotation for sodium nitrite and the new price is 6¾c. Competition is blamed for the 2½c decline in ammonium oxalate. Quotations are now 19c to 20c, depending upon quantity. A 5c increase in carlot quotations on sodium metasilicate was announced in the middle of January, and the new schedule is: crystals in barrels, carlots, $2.30; granular, carlots, $2.20; less-carlot delivered, $2.80; less than 20 barrels, delivered N. Y., $3.15. A 5c advance was noted in the barrel packing for sodium hyposulfite, making the differential between barrels and bags 20c. Schedule for strontium nitrate for the first quarter shows a ¼c per lb. advance, with carloads at 8¼c; 25 barrels or over, 8¾c; one to 24 barrels, 9¼c, all f.o.b. N. Y. The l.c.l. price structure of sodium silicate was advanced 5c, but no change was made in carload quotations.

With steel activity up to 32.7% as against 19.2% during Christmas week, a slightly better demand for sulfuric from steel makers was reported. Automotive production is currently averaging about 65,000 units weekly and the call for plating chemicals is still below normal. An excellent tonnage of calcium chloride is moving out for combating ice conditions on highways. The first week of the new year saw alkali demand drop sharply, but this condition was easily explained by the fact that consumers, specially in the l.c.l. group, had taken in heavy shipments in December in anticipation of higher prices. A steady improvement was reported in the last half of the month.

January bichromate tonnages were greatly below average for the month, but again this situation developed because consumers took extra heavy December deliveries in view of the rise in '38 contract prices. An improvement in leather production is actually underway and shoe production for the spring season is now expected to be somewhat better than anticipated.

The '38 chlorine cylinder price schedule was issued early in the past month. Prices are unchanged in all territories with the exception of certain Southwestern states, where slight reductions were placed in effect. A moderate demand took place for chlorine.

The outlook in textiles is somewhat better. A number of mills which have been on a 3-day basis are stepping up activity to a 5-day week. Grey goods are moving again. Completion of the revision of rayon yarn prices is expected to stimulate buying in that field, since stocks of rayon all along the line have been depleted. A slight betterment is expected in woolens, but this division of the industry is not overly optimistic. Silk is still very much of an uncertainty.

Deliveries of silk to mills in December amounted to but 21,982 bales, the lowest month since December of '21. November cotton consumption by mills totaled 484,819 bales, which represents a substantial decline from the 600,000 and 700,000-bale months which were typical of the first half of '37. Consumption of wool by mills during November totaled 13,900,000 lbs., the lowest monthly wool consumption figure since September of '34.

Southern Saltcake Plant

Southern Acid & Sulphur is building a new saltcake plant adjacent to its acid unit at Shreveport, Tenn. Plant is the first of its kind in that section of the country and its output will be employed in the production of paper from southern pine.

Important Price Changes

	Jan. 31	Dec. 31
ADVANCED		
Sodium hyposulfite	$2.45	$2.40
Sodium metasilicate, gran., c.l.	2.20	2.15
Strontium nitrate	.08¼	.07¾
DECLINED		
Ammonium oxalate	$0.19	$0.22½
Antimony, metal	.13¾	.14
Antimony oxide	.12½	.15
Copper, metal	.10	.10⅜
Copper oxide, black	.14¼	.15
Red	.16¼	.19775
Copper sulfate	4.25	4.50
Monohyd.	.09	.09¼
Sodium antimoniate	.13¼	.14¾
Sodium nitrite (c.l.)	.06¾	.07
Sodium stannate	.27½	.28½
Tin tetrachloride	.20¾	.21

Diamond's 25th Anniversary

Popular conception of the chemical industry is often that of a prodigious "infant"—yet many of its outstanding companies have reached the age of well ripened maturity. Several leading chemical companies are celebrating important milestones this year (Editorial, C. I., Jan., p. 14). Two years before the outbreak of the World War a new alkali producer was announced with a plant at Painesville, Ohio, strategically located both as to raw materials required and the markets to be served. "Time flies" is an often-quoted and true adage, yet it is difficult to realize that Diamond Alkali is this year celebrating a quarter of a century of existence!

In the past 25 years, years of war, prosperity, depression, world unrest, recovery, the company has without ostentation steadily expanded its facilities and the number of products produced. Today it manufactures over 100 products. In addition to a complete line of alkalies and chlorine, it produces a wide range of silicates through its Standard Silicate Division; bichromates through its Standard Chromate Division; and precipitated calcium carbonate in various forms for specific purposes through its Pure Calcium Products Division. Company is also an important factor in carbon tetrachloride. In commemoration of its silver jubilee a special booklet has been issued, "Twenty-Five Years of Continuous Service to Industry." Copies are available from main offices, Pittsburgh, Pa., or from company's distributors located in principal cities of the country.

At the turn of the new year L. G. Flaccus, president of the company, was elected chairman of the board, John T. Richards, formerly executive vice-president, became president, and William M. Robinson was elected to position vacated by Mr. Richards. George S. Cooper was elected vice-president in charge of sales, in place of Fred G. Lancaster who retired last July.

This is the first of a series of advertisements announcing a new list of products for which DOW *has developed new processes of manufacture. The* DOW *Chemical Company invites the opportunity to furnish organizations interested in these products with samples.*

Product:	**VINYL CHLORIDE** $CH_2{:}CHCl = 62.5$	**ALLYL CHLORIDE** $CH_2{:}CH{\cdot}CH_2Cl = 76.5$	**cis-DICHLORETHYLENE** $ClCH{\cdot}CHCl = 96.9$	**ETHYLBENZENE** $C_6H_5{\cdot}C_2H_5 = 106.1$	**DIETHYLBENZENE** $C_6H_4(C_2H_5)_2 = 134.1$	**TRIETHYLBENZENE** $C_6H_3{\cdot}(C_2H_5)_3 = 162.1$
Synonym:	Mono-Chloroethylene	3-Chloropropene	cis-Acetylene Dichloride	Phenylethane		
Properties:	Colorless liquid under pressure which readily volatilizes to a flammable gas with an odor somewhat similar to that of ethyl chloride.	Clear, colorless, volatile liquid with a mild characteristic odor.	Clear, colorless, mobile liquid with a mildly sweet odor.	Clear, colorless, mobile liquid with a pleasant odor.	Clear, colorless, very mobile liquid with a pleasant characteristic odor.	Clear, colorless liquid with a mild characteristic odor.
Specific Gravity 25/25° C.		0.933	1.281	0.866	0.868	0.870
Lbs./Gal. at 25° C.		7.8	10.7	7.2	7.2	7.2
Boiling Point	−14° C.	45° C.	59° C.	136.4° C.	181.2° C.	218° C.
Freezing Point			−80° C.	−94° C.		< −70° C.
Refractive Index at 15° C.			1.452			
at 25° C.		1.412		1.493	1.493	1.498
Viscosity, Centipoises at 25° C.		0.33	0.45	0.63	0.86	1.31
at 60° C.				0.44	0.57	0.79
Specific Heat cal./gm./°C.	0.27(1)	0.31	0.28	0.41	0.38(1)	0.4
Heat of Vaporization cal./gm.	81.6(1)	84.6(1)	70.2(1)	81.1 at B.P.		65.0(1)
Dielectric Constant 1000 cycles				2.3	2.2	2.2
Dielectric Strength (0.1" gap)				> 30,000 V.		23,000 V.
Power Factor				0.84%	< 0.05%	< 0.05%
Specific Resistivity at 26° C.				3.6×10^{12}		
at 60° C.					∞	∞
Flash Point		< 4° C.	< 4° C.		59° C.	83° C.
Fire Point		< 4° C.	51° C.		64° C.	90° C.
Solubility: ***In grams per 100 grams of solvent:***	Water sl. sol. at 25° C. Alcohol sol. at 25° C. Carbon Tetrachloride ∞ at 25° C. Ether v. sol. at 25° C.	Water insol. at 25° C. Alcohol sol. at 25° C. Carbon Tetrachloride ∞ at 25° C. Ether ∞ at 25° C.	Water insol. at 25° C. Alcohol ∞ at 25° C. Carbon Tetrachloride ∞ at 25° C. Ether ∞ at 25° C. Benzene ∞ at 25° C.	Water 0.014 at 15° C. Alcohol ∞ at 25° C. Carbon Tetrachloride ∞ at 25° C.	Water insol. at 25° C. Alcohol sol. at 25° C. Ether sol. at 25° C.	Water insol. at 25° C. Water insol. at 80° C. Alcohol ∞ at 25° C. Carbon Tetrachloride ∞ at 25° C. Benzene ∞ at 25° C.
Suggested Uses:	Manufacture of polymers and co-polymers for plastics. Intermediate	Solvent Organic synthesis Pharmaceuticals	Solvent Intermediate	Solvent Organic synthesis	High-boiling organic solvent. Manufacture of resins.	Solvent Heat transfer medium Dielectric Ethylating agent for Friedal-Craft Intermediate

(1)Calculated

TRADE DOW MARK

CHEMICALS INDISPENSABLE TO INDUSTRY

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

Branch Sales Offices: 30 Rockefeller Plaza, New York City • Second and Madison Streets, St. Louis • Field Building, Chicago
584 Mission Street, San Francisco • 2260 East 15th Street, Los Angeles

Shortage of Benzol Reported

Sharp Contraction of Coking Operations Reduces Supply Available—Dye Makers Showing Greater Interest in Intermediates—Naphthalene Refiners to Start Active Season—Fair Demand For Phenol—January Coal-Tar Chemicals Demand Disappointing—

If anything could be called a feature in the markets for coal-tar chemicals last month it would be benzol. Because of the sharp drop in coking operations the supplies of benzol in certain sections of the country have been diminished to the point where some producers are experiencing difficulty in making immediate shipments.

The volume of shipments of the general line of coal-tar chemicals was disappointing. Particularly was this true of the principal solvents, toluol, xylol, and solvent naphtha. The reason is not difficult to find. Activity in the automotive and tire areas has failed to improve substantially. Coatings manufacturers are operating at low levels and tire producers are endeavoring to work off inventories which are still extremely large.

Akron Tire Area Dull

Shipments of tires in December amounted to only 3,153,402 units, compared with 3,770,616 in November and 5,015,872 in December of '36. Production in December totaled 2,952,177 units against 3,111,332 in November and 5,311,007 in December of '36. Production for the year '37 was 55,264,895, against 58,116,349 in the previous year. Inventories at the end of the 4th quarter totaled 11,114,399, against 9,011,542 at the end of the previous quarter. Under the circumstances little incentive exists for the tire manufacturer to step up production at this time.

Naphthalene Refiners More Active

Inquiries for refined naphthalene from dealers and merchandising organizations are beginning to shape up, but as yet little actual placing of contracts has taken place. Refiners are showing slightly greater interest in crude material and the busy manufacturing season is not far off. Refiners of crude are concerned over the low rate of coking operations and there is the possibility that some difficulty may be experienced late in the producing season in obtaining adequate supplies of crude.

A slightly better demand for coal-tar acids and intermediates took place immediately after the first of the year. Dye producers are stepping up operations in anticipation of improved manufacturing conditions in textiles and leather. So far the call for dyes has been disappointing, but seasonal influences are expected to be felt in the very near future.

A fair demand for phenol continues from the plastic and resin fields. Disinfectant makers momentarily are showing only mild interest in cresylic and supplies are ample, in strange contrast to the conditions existing a year ago. Firm prices prevail for creosote, but consumption by the railroads is at a low ebb and probably will remain so until the carriers are granted further rate increases. Phthalic anhydride prices continue firm, despite a lessened demand and increased productive capacity for the manufacture of the item.

Slump in Coking Operations

Production of coke in December continued the precipitous downward trend begun in October, the daily rate for the month, amounting to 96,546 tons, being 15.4% less than that of November and 35.6% under the rate obtained in December of '36.

Output of byproduct coke in December amounted to 2,829,225 tons. Practically all of the decrease occurred at furnace plants, where the operating rate, reflecting the continued recession in iron and steel activities, dropped 20.3%. Stocks of byproduct coke at the end of December were 2.1% lower than at the beginning of the month. All of the decrease occurred at merchant plants, where reserves were depleted by 6.4%. At furnace plants the stocks rose in volume 4.4%. At the close of the year total stocks were 45.7% higher than on Jan. 1, 1937.

Benzol Production, December & Year

Benzol production in December totaled 6,340,000 gals., as against 7,472,000 in November, a decline of 15.1%. Benzol production in December of '36 amounted to 10,376,000 gals. Total production of benzol in '37 totaled 117,014,000 gals., an increase of 11.4% from the 105,086,000 gals. produced in '36.

Contracts to Koppers

Koppers will construct 69 new coke ovens for Republic Steel at a cost of $1,250,000, replacing old No. 3 battery at Youngstown which had 61 ovens. New battery will increase coke production by 15% to 90,000 tons a month. Extensive repairs will also be made to byproduct plant. . . . Koppers also contracts to modernize the light oil recovery plant of Dominion Steel and Coal, Sydney, N. S.

Coal-tar Chemicals

Important Price Changes

ADVANCED

Jan. 31 Dec. 31

None.

DECLINED

None.

Calco Entertains

Between 45 and 50 officials, plant superintendents and other representatives of textile and dyeing concerns which do business with Calco were guests of the company on Jan. 15.

Following the arrival of the men in the morning, they were taken for a tour through the plant. The day's activities closed with a dinner at the Bound Brook Inn.

Calco representatives who showed the visitors through the plant and attended the dinner are: vice-presidents F. M. Fargo, August Merz and J. F. Warner; H. S. Morrow, director of technical service; R. E. Sumner, dept. sales manager, and by whom the arrangements were made for entertaining the visitors and the following from the sales department: W. C. Harmon, J. L. Naylor, H. E. Thayer, R. E. Ockford and Paul Luck.

Pfister Heads Amalgamated

Jacob Pfister, formerly of Calco's Providence, R. I., office, is the new president of Amalgamated Dyestuffs & Chemical, Newark, N. J.

New Cresylic Distributor

Republic Chemical, 94 Beekman st., N. Y. City, in conjunction with W. E. Jordan & Brothers, Brooklyn, is now a distributor in the U. S. of all products manufactured by N. H. Graesser, Sandycroft, Chester, England. All types of cresylic acids and xylenols are available from warehouse stocks and special cuts or distillation ranges will be supplied.

Acquires Fiberloid

Monsanto Chemical has arranged to acquire all assets of the Fiberloid Corp., Springfield, Mass., manufacturer of plastics and molding compounds. Merger, reports President Queeny of Monsanto, will be effected by an exchange of capital stock on the basis of 7 shares of Monsanto for 12 of Fiberloid. Contracts have been approved and await ratification by stockholders of Fiberloid on Feb. 16. Monsanto, it was disclosed, has held a 14% interest in Fiberloid since '34.

Dr. Charles H. Carpenter, chief chemist of the Savannah Pulp & Paper Laboratory, is now assistant director.

MANUFACTURING CHEMISTS SINCE 1849

The "QUALITY" seal distinguishing Pfizer Products is more than a mark of purity and physical uniformity. Other essentials are very definitely in our quality background ... accurate control ... technical skill and well trained personnel throughout the organization ... modern equipment ... capacity ... the knowledge and the will to cooperate in special requirements ... strict observance of ethics applying to our industry.

CHAS. PFIZER & CO., INC. 81 MAIDEN LANE, NEW YORK 444 W. GRAND AVE., CHICAGO

Fine Chemicals

Hard Mercurials Quoted Lower

Quicksilver in New Decline, Reaches $78—Cadmium Metal Reduced 25c, but Cadmium Salts are Unchanged—Better Inquiry for Fine Chemicals and Pharmaceuticals for Spot Delivery—Little Interest in Foreward Buying—

The sustained weakness in quicksilver of the past few months carried over into January and quotations at the month-end were $78-$79, with some shading of even these prices reported. The price structure for the hard mercurials finally gave way in face of the bearish conditions in the metal and the following new quotations were placed in effect in the middle of the month: Calomel, $1.38 per lb.; corrosive sublimate, crystals, $1.30; granular and powder, $1.05; U.S.P. yellow mercury oxide, $1.81; red precipitate, $1.60; white precipitate in drums, $1.56.

Cadmium Now $1.35

A lessened demand for cadmium metal has brought about an increase of stocks and a decline of 25c. Producers of cadmium salts, however, did not change their quotations, insisting that the spread between the metal and the salts is still too small to justify price readjustments.

Hand-to-mouth Buying the Rule

Fine chemical manufacturers were somewhat encouraged by the volume of inquiries received early in the month and by the number of orders placed, but, in nearly all cases purchasing was for small quantities only. Buyers are still very much of the mind of holding strictly to the policy of purchasing for immediate requirements only. There is little incentive at the moment to covering future requirements on most items.

Citric, Tartaric Markets Quiet

Quiet conditions prevailed in citric acid with prices firm and unchanged. Little seasonal improvement has yet been noted for the tartars, but the markets had a firm tone in view of the fact that the raw material is unchanged.

C.P. Glycerine Steady in Price

The weakness in the several grades of crude glycerine did not affect the price for c.p. material. With "soapers" on a curtailed manufacturing basis the volume of crude becoming available will be decidedly less in the near future and much of the distressed material has been worked off the market.

Industrial Alcohol Demand Good

A fair demand for the various specially denatured grades of alcohol is reported, with the price structure firm and unchanged. Shipments of acetanilide for the manufacture of sulfanilamide have shown a sharp drop because of the unfortunate deaths from the use of an elixir in which the latter material was an ingredient, together with diethyleneglycol. A better demand was noted for camphor with the call for synthetic material improving. A stronger market exists for podophyllin, based on the inability of several manufacturers to obtain adequate supplies of the raw material at former price levels.

Menthol Up—Then Down

Suppliers of menthol advanced quotations 5c per lb. in the third week of the month but quickly cancelled the rise in the final week when it became apparent that available stocks were large and consumer interest was strictly limited.

Naugatuck's New Quarters

Naugatuck Aromatics, a division of U. S. Rubber Products, is in new quarters at 153 Waverly Pl., N. Y. City. John P. Coe, of Naugatuck Chemical, will be in charge of sales. Office is in direct charge of M. G. Couderchet.

German Synthetic Ephedrin

Three German firms are reported to be manufacturing synthetic ephedrin, according to reports reaching the Commerce Dept.'s Chemical Division.

Enlarged N. Y. Offices

Mallinckrodt Chemical's N. Y. City headquarters have been enlarged and completely renovated. Company has taken a long lease on the building adjoining the one at 72 Gold st. Greatly increased warehouse facilities and larger and more comfortable offices have been provided. The export division has been moved to the 3rd floor.

Granted 2-Year Leave

R. M. Stevenson, sales manager, Givaudan-Delawanna, N. Y. City, was granted a leave of absence on Feb. 1 so that he may devote all of his time for the next 2 years to his agency business in Detroit. His agency represents Givaudan-Delawanna in Detroit, and R. J. Prentiss & Co., and Pennsylvania Refining Co., Butler, Pa., on the latter's new odorless insecticide base "Insecti-Sol."

Guenther Returns

Dr. Ernest S. Guenther, chief chemist, Fritzsche Brothers, N. Y. City essential oil and aromatic chemical house, returns to the U. S. after an 8 months inspection trip in Europe and Africa.

Important Price Changes

ADVANCED

	Jan. 31	Dec. 31
None.		

DECLINED

Agar No. 1	$1.00	$1.05
No. 3	.68	.72
Cadmium, metal	1.35	1.60
Calomel	1.38	1.50
Corrosive, sublimate, cryst.	1.30	1.40
Gran. powd.	1.05	1.15
Mercury	78.00	81.00
Mercury oxide, U. S. P., yellow	1.81	1.91
Red precipitate	1.60	1.75
White precipitate	1.56	1.76

Simon, Heyden, Honored

George Simon, Heyden Chemical vice-president, has been awarded a parchment scroll, in recognition of the great work he accomplished recently as chairman of the chemical and drug division, N. Y. United Hospital Campaign.

Russe on Hospital Council

Dr. Fred W. Russe, secretary, and a director of Mallinckrodt Chemical, is re-elected president of the Hospital Council of St. Louis. He is also vice-president of the board of St. Luke's Hospital in St. Louis.

Relocates Branch Offices

Fritzsche Brothers, N. Y. City, reports that its Boston office is now at 206 State st., and that the San Francisco office is relocated at 1325 Howard st.

Attends Road Meetings

Dow Chemical had 19 men at the recent Cleveland convention of the American Road Builders' Association. From Midland were the following: Harold Knowles, F. M. Whaley, V. B. Redfern, G. F. Metcalf, Edward C. Earley, T. E. Williams, Wallace Curran, Arthur Smith, Jr., M. E. Hamilton, George Hemmerick, W. F. Stumpfig, Donald Williams, and Herman Miller. The N. Y. office was represented by Fred A. Koch, John Lewin, E. N. Knox, and John J. Miniutti, with Wilson I. Doan from the Chicago office and H. D. Crain from St. Louis, Mo.

On Road to Recovery

J. Albert Woods, Chilean Nitrate Sales' vice-president, was operated on for appendicitis on Jan. 19 at the Doctors' Hospital in N. Y. City.

A. E. Marshall, well-known consultant, is recovering from a serious operation. He left the hospital on Feb. 3 and will rest at his home for several weeks.

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Check these advantages—

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Keen Competition in Petroleum Solvents Reported

Rubber Solvents Reduced in Northern N. J.—V. M. & P. Naphtha Lowered in N. Y. and N. J.—Tricresyl Phosphate Down 2c—Methanol, Denaturing Grade, Quoted at 28c in Tanks—Poor Demand for Lacquer Materials—

Solvents & Plasticizers

Competition became keener in the petroleum solvents markets last month. Producers, with stocks accumulating, are becoming increasingly anxious to move material into consuming channels. The last announced break in prices occurred in the New Jersey market north of Trenton. A ½c decline was placed in effect on v.m. & p. naphtha in tankcars, bringing the level down to 10c and equal to the market price prevailing in New York. The tankcar price for rubber solvents in the northern New Jersey area was also revised downward by ½c, to a 9½c basis. At the same time, the tankwagon quotation was reduced 1½c per gal. to 13c. Midcontinent quotations were unchanged. Firm prices prevailed at the close of the month both in the East and Mid-west on petroleum thinners, Stoddard Solvent, and v.m. & p. naphtha, aside from some slight shading on petroleum thinners in the Chicago area.

The first break in the situation in the East since last August came about the middle of the month when v.m. & p. naphtha was lowered 1c, to a 10c basis in tankcars, and to 10½c in tankwagons, a drop of 1½c. Still earlier in January certain of the aromatic naphthas were revised in price, with No. 1 quoted at 16c; No. 2 at 18c; and No. 3 at 18c. Petrolatum prices were also lower, the first appreciable price revision in a year. Paraffin wax quotations also declined.

Tricresyl phosphate prices were reduced 2c in the middle of January. Technical grade No. 1 in carlots is now quoted at 24½c, smaller quantities at 39c (less than 5 drums). Grade No. 2 in carlots is 23½c; 5 to 28 drums, 24c; less than 5 drums, 38c.

Denaturing Grade Methanol Reduced

Fresh competition broke out in the market for denaturing grade methanol. The 2c decline in December was followed by a similar drop in January. On the new basis carlots, drums are quoted at 34c, and tankcars at 28c.

Coatings Production Discouraging

The demand for solvents generally failed to improve materially in the first 30 days of the new year. Raw materials used in the coatings industries are still in moderate demand only, nor is there much likelihood of any material change for at least 30 and possibly 60 days. By that time it is expected that activity on the part of the automotive manufacturers will have broadened somewhat. Production of cars in January did not total over 250,000 units, and a similar volume is expected in February because of the short month.

It is still too early to tell much about the actual movement of alcohol in the anti-freeze market. Weather conditions, however, have been generally favorable with cold snaps alternating with almost summer-like temperatures.

December Alcohol Production Declines

December production of ethyl alcohol amounted to 17,261,669 proof gals., as against 19,913,228 in December of '36, yet stocks in bonded warehouses at the end of the month expanded, the respective figures being 17,898,425 and 10,389,964. Production of completely denatured in December totaled 1,826,806 wine gals., compared with 1,831,934 in the same month a year ago. The removed totals were 1,841,127 and 1,990,349, respectively. Production of specially denatured dropped sharply, the December figure of 5,185,096 comparing unfavorably with 9,284,288 in December of '36. The removed figure for December '37 was 5,128,171, compared with 9,298,963 in December of the previous year. Stocks at the month-end showed a gain and were reported at 606,222, as compared with 452,613 on Dec. 31, '36.

December Methanol Production

December production of crude methanol totaled 461,539 gals., as compared with 423,315 gals. in November and 548,982 gals. in December of '36. December production of synthetic amounted to 3,887,741 gals., as against 3,562,372 gals. in November and 2,009,952 in December of '36.

Isopropyl Down 3½c

Isopropyl alcohol was also reduced sharply last month, the net loss being 3½c a gal. The new schedule is as follows: Refined, 91%, drums, car lots, 36c; l.c.l. 41c; tanks, 31c; 98%, drums, car lots, 41c; less than car lots, 46c; tanks, 36c; technical, 91% drums, car lots, 33½c; less than car lots, 38½c; tanks, 28½c; 98%, drums, car lots, 37½c; less than car lots, 42½c; tanks, 32½c.

Egloff is Chairman

Dr. Gustav Egloff, director of research for Universal Oil Products, Chicago, and internationally known scientist, is appointed chairman of the scientific and technical committee for the 10th International Petroleum Exposition to be held in Tulsa, Okla., May 14 to 21. Egloff's committee will have charge of the new Hall of Science, where the latest developments in scientific and technical equipment, built at the cost of $250,000, will be on display.

Important Price Changes

ADVANCED

	Jan. 31	Dec. 31
None.		

DECLINED

Methanol, denat. grade, tks.	$ .28	$ .30
drs.	.34	.36
Naphtha, v. m. & p., tks., North. N. J.	.10	.10½
Rubber Solvents, tks., North. N. J.	.09½	.10
Tankwagon, North. N. J.	.13	.14½

Change in SD Alcohol

Bureau of Internal Revenue on Jan. 19 announced an important change in denaturant regulations for SD29 Alcohol, used in the production of aldehydes, chloroform, ethyl butyrate, ethyl chloride, ethyl lactate, ethyl propionate, ethyl valerate, and glacial acetic. Previously SD29 required denaturation with acetaldehyde, but under the new regulations the use of any chemical produced from ethyl alcohol is permitted upon specific approval of the Bureau. It is reported that the change was granted upon representation that the acetaldehyde interfered with the action of catalysts in certain manufacturing processes.

Toxicity Studies on Solvents

The British Medical Research Council has prepared a report giving extracts from all the available literature on the effects of various organic solvents on men and animals. Report only carries the literature through 1935. It is entitled "Toxicity of Industrial Organic Solvents," contains 302 pages of text, and is obtainable from His Majesty's Stationery Office, London, at 7s. 6d.

Curtails Production

In an effort to bring inventories in line with requirements, Standard of N. J. will slash its refinery crude oil runs 15,000 bbls. daily for '38. It was also reported that, if necessary, further reductions in refinery runs will be made this year. On the other hand, if business conditions improve, the runs may be increased later on.

The industry's runs have been considerably in excess of requirements for some time, according to well posted observers, and, as a result, prices for many of the important petroleum products have weakened considerably.

Moves Chicago Office

Commercial Solvent's Chicago office is now at 1817 W. Fullerton ave., with Clyde Phillips in charge.

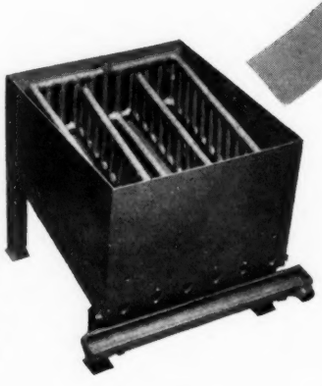
Sulphur & Service

VISIBLY Texas Gulf's service consists of the prompt shipment of thousands of tons of Sulphur by rail or water to process plants in all parts of the United States and Canada. This Sulphur, 99½% pure, is drawn from a reservoir constantly replenished at the rate of thousands of tons a day.

But back of these scenes is a service of importance to manufacturers. It is Applied Research . . . with all that the term implies. Sulphur — its properties and benefits — is being constantly studied by Texas Gulf's technical staff. New uses are being sought. Processing steps are being improved. Better handling methods are being developed.

One of the recent improvements in the handling of Sulphur is the TEGUL Sulphur Melter. Full details and construction drawings regarding this device will be sent on request.

TEGUL
Sulphur Melter



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Agricultural Chemicals

Late Fertilizer Season Declared Inevitable

Organic Ammoniates Advanced Early in the Month—Industry in Pessimistic Mood—Farmers Resist Higher Prices for Finished Goods—Mixers Cancelling Part of Their Foreward Purchases—Sulfate Advanced Feb. 1—Farm Bill "Stymied"

A flurry of interest in organic ammoniates in the first two weeks of the month was sufficient to raise the general price level above that prevailing at the close of the year, but it was of short duration.

A distinct feeling of pessimism has taken hold of the industry and the consensus of opinion is that sales will be nearer to 25% below last year than the 15% forecasted earlier in the month. With this outlook in mind, many mixers have cancelled a portion of their foreward orders. In the potash field such cancellations are said to total as much as 10% of the anticipated volume. Momentarily little interest is being shown in raw chemical fertilizer materials.

All hands agree that the season will be late. The farm bill has been sidetracked because of the Senate filibuster against the anti-lynching measure, and Secretary of Agriculture Wallace stated at the close of the month that he was doubtful that there would be sufficient time to apply acreage quotas to the '38 cotton crop. The delayed action of the Senate has thrown into utter confusion the whole question of crop control, and, under the circumstances, fertilizer manufacturers are unable to plan intelligently on their output.

Mixers have issued in most cases their prices for '38, and, because of higher raw material, labor, and freight costs, the general level is somewhat higher. The increased cost to the mixer is estimated to be between 75c and $1.25 a ton, and he is said to be passing on to the farmer only about two-thirds of this. Buyers of finished goods are not taking kindly to any advances and are pointing out that farm prices have dropped sharply from the peak reached last summer. The net result is delay in purchasing. The present stalemate, of course, will not continue indefinitely and another 30 days will see greater action, but the uncertainties are confusing and might lead to price demoralization, the scourge of the industry. One encouraging angle is that the small mixer is not heavily stocked with raw material and, therefore, the pressure is not as great as it has been at other periods.

Orders for delivery of nitrate against contracts so far have been disappointing, but prices remain stable. Sulfate producers have welcomed some of the cancellations that have come in because of the lack of material, the result of the low rate of coking operations. On Feb. 1 the 6-month contract price for sulfate expired and automatically higher prices now prevail for spot or for 5-month contracts. The potash market is extremely quiet and the same thing is true of the phosphate materials. There is little buying interest in either at the moment.

'37 Tag Sales Were Greater

The '37 tag sales totaled 5,849,789 tons, as against 4,793,775 in '36, and 4,321,583 in '35. December sales for the 17 states totaled 186,941 tons, as compared with 178,204 in '36, and 123,941 in '35. A detailed statistical study of the fertilizer industry in '37 will be found in the Statistical & Technical Data Section (Blue Section) of this issue and will continue in the March number.

December Superphosphate Output Up

December production of superphosphate (374,012 tons) was larger than that of December, '36, when it was 340,964 tons, but obviously the increase was not great. Total shipments in December were only 190,089 tons, as compared with 197,518 in December of the previous year. Stocks at the close of the year were somewhat larger than on the comparable date a year earlier, the respective figures being 1,845,001 and 1,535,208.

November Imports, Exports

November exports of fertilizers and fertilizer materials totaled 170,676 short tons, with a value of $1,951,745, an increase of 23% in tonnage and 44% in value over November '36. Nitrogenous materials, potash, and high grade hard rock were exported in much larger quantities than last year, but a decline occurred in land pebble rock. Exports in January-November period totaled 1,552,070 tons, a decline of 13% from the same period of '36.

November imports, totaling 172,329, valued at $3,754,844 exceeded November of preceding year by 55% in volume and 48% in value. In the nitrogenous group a sharp rise in sodium nitrate more than offset declines in imports of ammonium sulfate and cyanamid. Upward trend in imports of muriate and 20% kainite, which had been so pronounced earlier in the year, continued in November. Imports in first 11 months were 35% above same period of '36. With the exception of sulfate of ammonia, which fell off about half, all important materials were bought in larger quantities. Value of fertilizers and fertilizer materials imported into U. S., in first three-quarters of '37, registered a 48% increase over '36, compared with a 34% increase for all imports.

Important Price Changes

	Jan. 31	Dec. 31
ADVANCED		
Blood, domestic, N. Y.	$3.10	$3.00
Chicago	3.35	3.00
Imported	3.45	3.25
Fish meal, Menhaden, grd., Balt.	53.50	53.00
Hoof meal, Chicago	3.35	3.20
Nitrogenous mat., East	2.65	2.50
Imported	2.65	2.55
Tankage, imported	3.45	3.25
DECLINED		
Bone meal, 3 & 50, Chgo.	$19.00	$20.00
Imported	23.50	23.75
Nitrogenous mat., West	2.20	2.25

Freight Rate on Bones

I.C.C. on Jan. 8 released its decision of Dec. 14, '37, in I & S Docket No. 4335, "Proposed rates on bones other than human or fresh meat bones, ground or unground, in carloads, between various points in the U. S." Only one increased rate, that on imported bones from Norfolk, Va., to Mt. Airy, N. C., was found justified. All others were found not justified and were ordered cancelled.

I. C. C. issued last month notice to the effect that increased freight rates between Official and Southern Territory on fertilizer and fertilizer materials, filed to become effective on Jan. 20, would not be suspended but would be allowed to go into effect on that date. These increases were filed under the Commission's findings in Ex Parte 115 and are in addition to any increases that may be granted under the "Fifteen Per Cent. Case of 1937" now under consideration by the Commission.

World Superphosphate Figures

World consumption of superphosphate fertilizer in '36 increased 8% in quantity to a total of 15,707,800 metric tons, according to London estimates. U. S. led with consumption of 3,850,000 tons, followed by France with 1,447,260 tons, Italy with 1,337,400, and Russia with 1,225,000 tons. Other large consumers included Germany, the United Kingdom, Spain, Denmark, and Sweden.

Soil Improvement Planned

Mid-West fertilizer manufacturers have organized a Soil Improvement Committee and will conduct educational work designed to help the farmers in purchasing of fertilizers. Wood Crady, Federal Chemical, Louisville, Ky., is chairman.

Tariff on Tankage?

Senator Gerald P. Nye (Rep., N.D.) introduces bill that would make tankage, unfit for human consumption, subject to an import duty of $13.25 per ton. Under the '30 tariff act tankage is on the free list.

CUE

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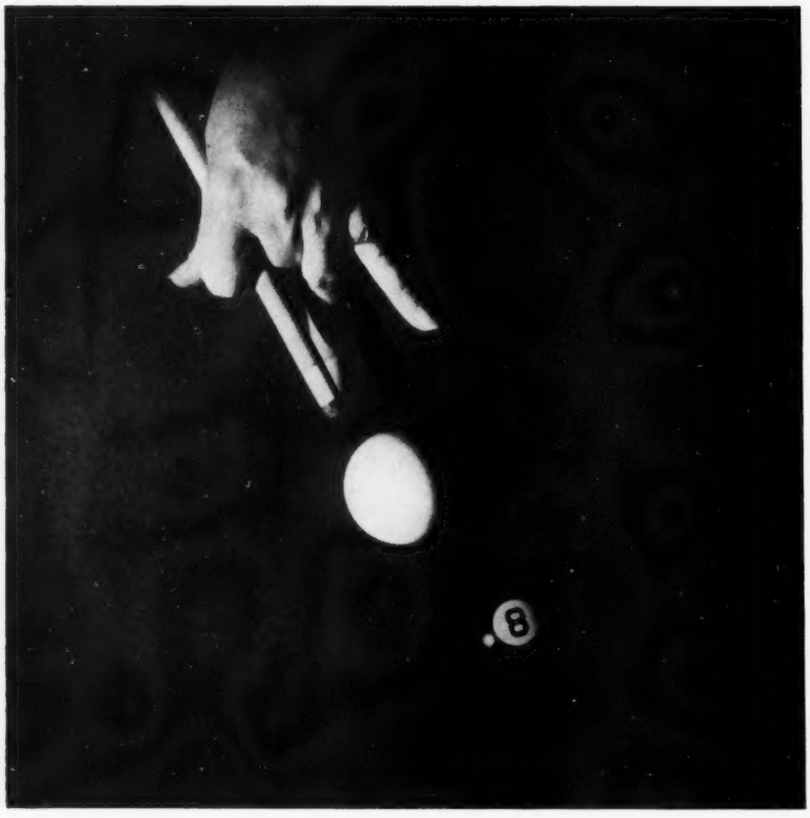

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STARKIE

Fats and Oils

Better Inquiry for Soap and Paint Oils Develops

Purchasing, However, Largely for Immediate Needs—Chinawood Quoted at 15c—Sharp Advances in Refined Menhaden and Sardine Oils—Linseed Firmer in Tone—Cottonseed Oil December Consumption of Record Proportions—

The uncertainties in the general outlook continue to act as a deterrent to any appreciable forward buying of fats and oils. Despite attractive prices for several oils actual purchasing is largely limited to immediate manufacturing requirements. The word inventory has taken on an ominous meaning in the eyes of most buyers.

Price movements in the fats and oils were mixed in the past 30 days. The first change in a long period of time was made in the various grades of castor when refiners lowered quotations 1c. Chinawood lost ½c in the period under review. Interest is almost at a standstill and most of the trading in the item centered in resales. It is reported that some oil for delivery, probably in April or May, was offered at 13½c in tanks. In some quarters it is felt that it will be easier rather than more difficult to get oil out of China over the next few months. Weakness was apparent in perilla and oiticica. Prices for babassu held firmly, due to lack of supplies of the basic material, the importations of kernels having been very light for several months because of higher costs in primary centers.

Firmness in corn was reflected in higher prices for crude and refined grades of the oil. In the vegetable oil group peanut and soybean were somewhat firmer. Refined grades of menhaden and sardine oils were advanced sharply. Increase in the latter is said to be based on reports of a disappointing fishing season on the Pacific Coast, with the strong possibility that should demand increase substantially, a shortage of supplies would be inevitable.

A fair volume of trading in soap oils was reported last month, the first real entrance into the market by the soap producers for several months, and indicating that their inventories are declining to more normal levels. Sumatra palm oil at 3⅞c in tanks attracted considerable interest compared with tallow at 6⅜c. Some sizable sales of coconut were also reported, but the volume was not sufficient to add any degree of firmness that would sustain higher prices. The trade, however, in view of the entrance of the "soapers" into the market, would not be surprised to see copra and oil work into higher levels over the next month or so.

Crushers reported awakened interest in linseed in the first two weeks of January. An inside market as low as 9.2c brought buyers out of their shell and a sizable quantity of oil changed hands. But when crushers started to advance quotations interest died out and the market was quite lifeless at the month-end.

Cottonoil consumption in December again was of record proportions, the total of 358,328 bbls. being slightly in excess of the previous all-time peak for December and made in December of '36. Visible supply of the oil is about 20% above last year and approximately 15% above the 10-year average. It should be remembered, however, that consumption has also been running ahead of the 10-year average by even a greater percentage. Prices for both crude and bleachable prime summer yellow were slightly higher at the close of January than they were at the year-end. One bearish note in the market was the report that Brazilian oil was being purchased for future delivery.

Flaxseed-Linseed Quarterly Totals

Director of the Census, William L. Austin, announces that, according to preliminary figures, there were 23 mills in the U. S. which crushed flaxseed during the quarter ending Dec. 31, '37, reporting a crush of 217,114 tons of flaxseed and a production of 150,431,644 lbs. of linseed oil. These figures compare with 194,071 tons of seed crushed and 131,898,873 lbs. of oil produced for the corresponding quarter in '36; 231,942 tons of seed and 156,607,804 lbs. of oil in '35; 127,944 tons of seed and 90,253,182 lbs. of oil in '34; 189,266 tons of seed and 133,905,936 lbs. of oil in '33; and 139,934 tons of seed and 90,987,258 lbs. of oil in '32.

Stocks of flaxseed at the mills on Dec. 31 amounted to 92,250 tons compared with 80,193 tons for the same date in '36, with 119,663 tons in '35, with 51,836 tons in '34, with 75,975 tons in '33, and with 87,384 tons in '32. Stocks of linseed oil reported by the crushers were 154,281,806 lbs. on Dec. 31, '37, compared with 79,817,307 lbs. for the same date in '36, with 112,405,721 lbs. in '35, with 78,198,651 lbs. in '34, with 119,656,272 lbs. in '33.

Rules on Coconut Oil Tax

Ruling of U. S. District Judge John H. Druffel in Cincinnati on Jan. 14 in the matter of the 3c tax on coconut oil promises to bring recovery of certain taxes paid by "soapers" and others.

In suit brought by Cincinnati Soap to obtain refund of taxes paid on refined coconut oil, court declared that 3c levy applied only to first processing and that taxes paid on oil refined at the time tax went into effect were recoverable. Commissioner of Internal Revenue had ruled that tax applied to oil which had been processed prior to date tax went into effect, May 10, '34. This recent decision does not affect current taxation and since it applies only to a limited amount of coconut oil will not involve large sums.

Important Price Changes

	Jan. 31	Dec. 31
ADVANCED		
Corn, crude, tks.	$0.07	$0.06⅝
Lard oil, common, bbls.	.09¼	.08¾
Linseed, boiled, tks.	.10	.096
Menhaden, ref. alkali, tks.	.081	.074
Light pressed, tks.	.074	.067
Neatsfoot, extra	.10	.09½
Peanut, crude, tks.	.06¾	.06⅝
Sardine, crude, tks.	.43	.37
Refd. alkali, tks.	.081	.074
Light pressed, tks.	.074	.067
Soybean, crude, tks	.06½	.06
Stearine, oleo	.07¼	.07
DECLINED		
Castor, blown	$0.11¼	$0.12¼
No. 3	.09¼	.10¼
Chinawood, drs.	.15	.15½
Tanks	.15	.15½
Coconut, crude, tks.	.04	.04⅛
Neatsfoot, C. T.	.16¾	.17¼
Oiticica	.12½	.12¾
Oleo, No. 1	.09½	.10½
No. 2	.09	.10
Palm kernel	.04¼	.04½
Perilla tks.	.10½	.11

Imports, Exports in November

November imports of chemicals, drying oils, and related products ($14,400,000) were the lowest for any month of '37 and approximately the same as in November '36. Receipts of most of the products making up this group have declined steadily since March '36, during which month the aggregate reached a value of approximately $23,000,000, highest figure recorded for any month in 6 years.

Although seasonally lower, November exports of chemicals and related products, recorded at $14,593,000, were about 24 per cent. above the $11,753,000 reported for the corresponding month of '36. Most leading items making up the list shared in the gain, but naval stores, however, continued to lag behind the record for '36.

Chemical specialties were valued at $2,216,500, a gain of 43 per cent. above the $1,558,000 reported for November, '36. A sharp gain also took place in fertilizers. Sulfur shipments increased substantially, compared with November, '36. Crude increased from 37,684 tons to 49,000 tons and in value from $691,000 to $864,000.

Willing to Compromise

Activated Sludge, Inc., is reported offering to settle its suit against City of Milwaukee for $1,780,133 in which a judgment of $4,943,000 had been awarded.

Aubrey Bartlett's libel suit for fifty thousand dollars against the Thompson-Hayward Company, over a statement made in connection with Bartlett's bid to the United States Engineering Department in the first New Orleans district, on arsenic, has been settled out of court.

STARRING!

A NEW SOURCE OF SUPPLY FOR FATTY ACIDS • ABIETIC ACID • PITCH

The Paper Industry is fast becoming an important source of raw materials for users of Fatty Acids, Abietic Acid and Pitch. Industrial Chemical Sales is a pioneer refiner of these products and from its plants at Covington, Va., and Charleston, S. C., can offer large quantities of the following:

INDUSOIL

Excellent as a blend with red oil for textile soaps and can be used with red oil for most other applications required of red oil, including cutting oils, drawing compounds, soluble oils, pine scrubs, etc.

A blend of refined fatty acids, with the following specifications:

AVERAGE QUALITY OF INDUSOIL

Specific Gravity 60°/60° F.	0.96-0.98
Pour Point	47° F.-52° F.
Viscosity (Saybolt)	
@ 100° F.	700-900 Sec.
@ 210° F.	70-80 Sec.
Flash Point	350-380° F.
Fire Point	410-430° F.
Sediment	None
Moisture	Practically None
Ash	Practically None
Completely Soluble in	Petroleum Ether
Acid No.	150-170
Saponification Value	150-170
Color (Rosin Scale)	G-I
Fatty Acid	43-47%
Rosin Acids	38-42%
Sterols	13-17%

ABIETIC ACID

A distilled product, excellent in color and meeting the following requirements:

Acid No.	176-185
Saponification No.	176-185
Iodine No.	150-170
Color (Rosin Scale)	N (Opaque)
Melting Point	230°F.-250°F.

LIQRO

A blend of crude pine fatty acids, with the following specifications:

Acid No.	150 to 160
Rosin Acids	40 to 50%
Fatty Acids	35 to 45%
Sterols	15 to 20%

This material is available in large quantities both from our Covington, Va., mill and our new mill at Charleston, S. C. Indicated uses are for asphalt emulsions, cutting oils, low priced soaps, and many other applications where a low price fat is a requirement.

Present prices on contract F.O.B. Charleston, S. C.

Tank Cars ..... $35.00 per ton Carloads, in drums $45.00 per ton

Large samples and specific data available on request.

PITCH

A new type pine fatty acid pitch, available from the distillation of Liqro, resulting in a pitch of excellent color and with a melting point of 85° to 95° F.

Samples, Specific Data, and Additional Information can be secured by writing

INDUSTRIAL CHEMICAL SALES

DIVISION WEST VIRGINIA PULP AND PAPER COMPANY

230 Park Ave.
New York, N. Y.

1002 Lincoln Ave.
Tyrone, Pa.

417 Schofield Bldg.
Cleveland, Ohio

204 W. Wacker Drive
Chicago, Ill.

Natural Raw Materials

Corn Derivatives Priced 5¢ Higher

Firmer Tone in the Grain Causes Upward Revision of Dextrin, Starch, Corn Sugar, etc.—Italian Ground Sumac at $65—Wattle Bark Extract Lower—Poor Demand for Gums, Waxes—Shellac Fails to Improve—Naval Stores Unsettled—

Trading in the majority of raw materials in the past month was spotty. Purchasing was irregular, indicating that buyers are unwilling to contract ahead with so many uncertainties present in the business situation. Until such time as conditions show a definite indication of taking a turn for the better, light buying probably will continue. A generally rising market is one conducive to heavy forward purchasing. At the moment there are very few items that appear to be ripe for an upward price movement.

A firmer tone in the market for corn last month was reflected in a 5c rise in starch, dextrin, corn sugar, and corn syrup. The slightly firmer appearance in naval stores resulted in a 2c advance in the rosin oils.

Strong Market in Valonia

Movement in natural dyestuffs and tanstuffs was mixed. Higher prices were made for ground Italian sumac and valonia, beards, for shipment, was much stronger on the downward side; J1 myrobalans declined $2 to a basis of $28, and J2 dropped $1.50, to a $21 level. A decline of 2/8c per lb. was announced in wattle bark extract.

Natural Varnish Gums Quiet

Suppliers of natural varnish gums report little interest since the first of the year and movement of material under existing contracts has been below earlier anticipations. Cabled offerings from primary sources in the final two weeks of the month showed little change. Price changes in the past month were relatively few following the general downward revision on the Congo gums which took place at the end of December. Outstanding in January price readjustments were a 1c decline in copal Congo No. 7 (pale straw bold); a 1½c reduction on damar Singapore to a basis of 19⅝c; a ⅜c drop in No. 2 grading. A 25c decline in Thus was also announced, with sales at $13.50 per 280 lbs.

Routine Trading in Wax Market

Quiet conditions are reported in the wax markets. Price changes were restricted to ½c reductions for Brazil and Chile beeswax; a 1c loss in No. 1 yellow Carnauba and the same amount for No. 2 yellow; a ½c decline in No. 3 N.C.; and a ½c rise in No. 3 chalky. Bayberry and Japan were unchanged.

The slight weakness in Carnauba was attributed to the accumulation of stocks in this country. Cable advices from Brazil are bullish on futures, based on reports of weather conditions unfavorable to crop gathering.

No worthwhile improvement in the shellac market is discernible and shading of prices in an effort to stimulate buying is reported. Primary markets in both London and Calcutta were generally firm throughout the month. A comparison of '37 and '36 statistics of the London shellac market, also a comparison of production in India for the two years is given below:

	Packages	
	1937	1936
Landings	63,120	44,545
Deliveries	57,252	87,499
Stocks, Dec. 31	132,592	125,916

Figures for production in India in '37 and '36:

	*Maunds	
	1937	1936
Kusni	89,375	382,250
Katki	342,500	380,250

* A maund equals 82 lbs.

Mixed Price Movement in Rosins

In December the poorer grades of rosin moved downward, while the higher grades moved upward. Somewhat the opposite of this took place in January, when the poorer grades advanced, but movement in the better grades was mixed, I, K, M, and N were lower and WG, WW, and X closed higher. Turpentine, after losses in the middle of the month, rallied to 26½c at Savannah, a net gain of ½c for the month. Export business dropped off sharply in January, following the rush in December, caused by the imminent rise in ocean freight rates on Jan. 1. Domestic movement was highly irregular. A fair interest was shown in the first two weeks of the month, but the rather bearish news in the last half, combined with the generally lower prices prevailing in most commodity markets, had a chilling effect and buyers lost most of their earlier enthusiasm. Statistically, a definite improvement should take place in the next 60 days for receipts at primary ports are dropping rapidly. A comparison of end-of-the-month prices at Savannah follows:

	Jan. 31	Dec. 28*	Net gain or loss
B	$4.60	$4.25	+$.35
D	4.60	4.25	+ .35
E	4.60	4.25	+ .35
F	5.60	5.50	+ .10
G	5.65	5.60	+ .05
H	5.75	5.75	...
I	5.75	5.85	— .10
K	5.75	6.00	— .25
M	5.90	6.15	— .25
N	6.00	6.20	— .20
WG	7.05	7.00	+ .05
WW	7.75	7.40	+ .35
X	7.75	7.40	+ .35
Turpentine	26½c	26c	+ ½c

* Last trading day in December

R. O. Ekholm is now an assistant to J. R. Garrason, manager of the Chicago office of E. W. Colledge, Inc., large factors in naval stores, etc.

Important Price Changes

	Jan. 31	Dec. 31
ADVANCED		
Corn sugar, tanners	$3.20	$3.15
Corn syrup, 42°	3.16	3.11
43°	3.21	3.16
Dextrin, British gum	3.80	3.75
Corn, canary	3.55	3.50
White	3.50	3.45
Egg yolk, imported	.68	.60
Rosin oil, 1st rect'fd	.54	.52
2nd rect'fd	.56	.54
3rd rect'fd	.60	.58
Starch, corn pearl	2.98	2.93
Powd.	3.08	3.03
Sumac, grd.	65.00	62.00
Valonia, beards	50.00	37.50
Wax, Carnauba No. 3, chalky	.33½	.33
DECLINED		
Albumen, egg, dom.	$1.05	$1.10
Gum damar, Singapore, No. 1	.19⅝	.21¼
No. 2	.15	.15⅜
Gum thus	13.50	13.75
J1 Myrobalans	28.00	30.00
J2 Myrobalans	21.00	22.50
Sago flour	.02¾	.03¼
Wattle bark, extract	.04⅛	.04⅝
Wax, bees, Brazil	.26½	.27
Chile	.26½	.27
Wax, Carnauba No. 1 yellow	.41	.42
No. 2, yellow	.40	.41
N. C. No. 3	.33½	.34

Hercules Sues

A patent infringement suit has been filed in the U. S. District Court, Wilmington, Del., by Hercules Powder against Newport Industries, and General Naval Stores. Infringement by the defendants of the patent of Harry E. Kaiser and Roy S. Hancock for "high-grade rosin," assigned to Hercules by them May 28, '29, is alleged by plaintiff company.

Jacksonville Headquarters

Antwerp Naval Stores, one of Savannah's oldest exporters and dealers in naval stores, will transfer its main headquarters to Jacksonville in May, retaining a small office at Savannah.

Increased Output

Faultless Starch, Kansas City, is increasing its plant facilities at 1025 W. 8th st. . . . The Egg-White Products Co. has been formed to manufacture dry albumen in a plant at 1401 Woodland ave., Kansas City, Mo.

Sun Oil to Expand

At least one-half of the $11,000,000 Sun Oil expansion program will be at the Marcus Hook refinery. A large building program is also planned for Toledo.

Changes Company Name

The Eastern Mineral Spirits Co., Long Island City, is the new name for the R. J. Brown Corp., distributor of thinners, solvents, etc. Location remains unchanged—29-28 41st ave., Long Island City.

Pigments and Fillers

Carbon Black Price Slashed Again

Sixth Decline Brings Market to Record Low of 2¼c—l.c.l. Quotations also Reduced—Lead Pigments Higher—Weakness in Franc Lowers French Orange Mineral—Ester Gum Now 8¼c—Casein Weak—Paint Outlook Brightens—

Important Price Changes

ADVANCED

	Jan. 31	Dec. 31
Lead, metal, St. L.	$4.75	$4.60
Litharge	.064	.06¼
Red lead, 95%	.074	.07¼
97%	.0765	.07½
98%	.0790	.07¾

DECLINED

Brown iron oxide, pure precip.	$0.10	$0.12¼
Carbon black, bgs., tks.	.027	.0295
Casein, 20-30	.10	.10½
80-100	.10½	.11
Ester gum	.08¼	.09
Orange mineral, French	.13⅛	.15⅛
Mercury oxide, tech., red	1.34	1.49
Yellow	1.29	1.39

November Paint Exports-Imports

November exports of paints and paint materials, including pigments, recorded at $1,550,700 in November, were seasonally lower but almost 10 per cent. above the $1,413,000 reported for this group of commodities in November '36.

November exports of ready-mixed paints, varnishes, and lacquers were valued at $534,500 against $480,000 for the corresponding month of '36, preliminary statistics reveal. In this group exports of lacquers increased from 94,000 gals. to 137,000 gals.; and ready-mixed paints from 147,500 gals., to 164,000 gals. Export shipments of varnishes, however, declined from 43,600 gals. to 34,000 gals. during these periods.

Other items on the list recording gains in November over the same month of '36 included paste paints, value of which increased from $26,360 to $35,000 but exports of bituminous paints declined in value from $31,600 to $35,000 and kalsomine or cold water paints from $31,000 to $28,000.

Among the pigments, exports of carbon black increased from 13 to 15 million lbs. and value rose from $602,000 to $698,000 —shipments of mineral earth pigments to foreign markets, however, declined from 5 to 3 million lbs. in quantity and the value received was down from $45,000 to $43,000.

Trend of Imports

Trend of paint material imports was generally downward in November, analysis reveals. Compared with the same month in '36, receipts of flaxseed declined from 2,706,500 bu. to 1,773,650 bu.; imports of tung oil at 6,368,670 lbs. were slightly less and varnish gums at 4,817,000 lbs. were about the same as in November '36. Approximately 2,792,000 lbs. of perilla oil arrived in November against none in the same month of '36 and 447,750 lbs. of oiticica oil were imported from Brazil.

The price war in the carbon black field continued to hold the spotlight in January. Although quotations have long since sunk well below actual production costs this fact appears to be no deterrent to further slashes in this desperate battle. With the base price at 2¼c for bags and tankcars for standard blacks producers by Jan. 12 (the date of the last reduction) have cut the market 43 per cent. This represents approximately $6,000,000 loss annually. Of course there is the possibility that price readjustments may be made 6 months hence.

At the moment, however, consumers are wondering how long the producers can "stand the gaff." Since November one reduction of a ½c and 5 declines of a ¼c have been made. The fight has centered around the contention of one manufacturer that tankcar quotations should be a ¼c below the bag figure. Even the l.c.l. price structure weakened in January, the warehouse quotations declining to 5¾c in bags, 6¼c in cartons, and 7c for cases. Special grades are unaltered.

On the latest basis standard blacks in carlots in either tankcars or bags are quoted as follows: Zone A, 2.70c; Zone B, 3c per lb.; Zone C (50,000 lbs.), 3.15c; and in 30,000 lb. quantities, 3.30c; Zone D, 3.15c; Zone E, 3.30c; Zone F, 3.60c, and Zone G, 3.80c.

Lead prices advanced last month and brought about higher quotations for litharge and red lead in large quantities. The l.c.l. price structure of the latter was not readjusted, but if the $3 January advance in lead holds there is the strong likelihood that revisions will be announced. A sharp decline in French orange mineral was caused by the slump in the franc. The ochres were not affected.

Lower Glycerine Prices Did It

Ester gum manufacturers announced their new schedule of prices, and, as was expected, quotations were lowered because of the low price level prevailing for glycerine. In the zone comprising New England states, New Jersey, eastern New York, eastern Pennsylvania, Delaware, and Maryland, the prices are now 8¼c for contracts for 75,000 lbs. or for spot deliveries of 10,000 lbs.

Casein Surpluses to Blame

Casein softened again last month and a ¼c reduction brought the level for 20-30 mesh down to 10c and 10½c for 80-100 material. Further weakness in mercury forced a 15c decline in technical red mercury oxide, and a 10c loss in the yellow oxide.

Naturally while uncertainties abound, the outlook for paint sales remains unknown, but any recovery in building volume might bring more than a proportionate upturn in paint production, for manufacturers generally are not stocking dealers as heavily for the spring season as has been the custom in the past. Ways and means of stimulating construction and modernization are receiving a great deal of attention in government circles. Restoration of F. H. A. insured modernization loans under the pending housing bill may provide a worthwhile impetus. Various estimates are heard in the trade as to the probable decline in paint sales in '38 over '37 and they run from 20 per cent. as a maximum to 5 per cent. as a minimum and there are a few who still hold that the total in the current year will not fall below last year's volume.

Paint Production Fails to Gain

Paint manufacturing operations are well below those prevailing a year ago and the answer is not difficult to obtain. Last year paint producers were facing rising costs for raw materials and, anticipating excellent demand, they rushed production. Also, with advances in paint prices imminent, dealers were keen to stock heavily. This year the situation is completely reversed. Prices for many paint materials have declined sharply in the past few months, notably, carbon black, lead pigments, zinc oxides, rosins, casein, turpentine, etc. Paint manufacturers are not anxious to speed up production, suspecting that by waiting they will buy raw materials still cheaper, and the retailer in turn is of the opinion that demand will be spotty and that by holding off he will buy below current levels.

6-Year Construction Record

The amount of construction undertaken during '37 reached a 6-year peak. Total contracts awarded in the 37 eastern states attained the highest dollar value for any year since '31, according to T. S. Holdon, vice-president of F. W. Dodge Corp. In residential building, it is necessary to turn back to '30 to find a total which can match the '37 volume. Contracts awarded in the 37 eastern states for '37 amounted to $2,913,060,000. This total represents an increase of 9 per cent. over the '36 total of $2,675,296,000.

The December '37 contract record for the 37 states totaled $209,450,600 of which $43,479,500 was for residential, $101,210,300 for non-residential, $46,474,800 for public works and $18,286,000 for public utilities.

Du Pont Nets $88,031,943 in 1937

Lammot du Pont Reports in Detail on Year's Operations—Freeport Sulphur Reports Best Year Since '30—Inventory Adjustments Cut Sharply into Hercules' Earnings—Atlas Reports Net of $1,433,871—American Agricultural Chemical Earns 63c a Share in Last 6 Months—

Du Pont in a preliminary statement reports consolidated net earnings of $88,031,943 for the year ended on Dec. 31, 1937. Company received $36,672,635 from its investment in G. M. common stock. After providing for dividends on the company's debenture and preferred stocks, earnings applicable to common stock amounted to $7.29 a share. This compared with $7.56 earned in the previous year.

Lammot du Pont in announcing the results said that the company spent approximately $48,000,000 for extension and betterment of plants last year and that it contemplated spending approximately $35,000,000 for such purposes in 1938.

He said the company and its subsidiaries paid out in wages and salaries approximately $107,500,000 to about 57,800 employees; that purchases from others amounted to approximately $170,000,000, principally for materials for construction and operating purposes; that the company's federal, state and local taxes for 1937 amounted to approximately $18,900,000, and that dividends in the amount of $76,746,061 were declared payable to about 78,000 stockholders.

Du Pont had 73,369 stockholders at the close of 1937, a gain of 9,000 during the year, Lammot du Pont, president, announced on Jan. 26. Individual holdings comprise 56,577 holders of common shares, 13,358 holders of debenture shares and 7,857 holders of preferred shares, but in this total there were 4,423 instances where the same stockholder held more than one class of stock. About 2% of the stock is held in foreign countries.

There are nearly 1½ times as many stockholders as employees, total employed at the end of the year being 52,000. Of the 56,577 common stockholders, more than 90% hold lots of 100 shares or less, while the average common stockholding is less than 200 shares. More than 30,000 stockholders, about 42% of the total, are women. More than 6,000 stockholders are trustees, and about 4,000 are employees of the company.

Freeport Makes Favorable Report

Benefiting from the high rate of industrial activity last year, coupled with a recovery in the earning power of its manganese subsidiary, Freeport Sulphur reported a net profit equal to $3.30 a share on its 796,381 shares of common last year, the best showing made since '30. It was one of the few companies to show better net earnings in the final quarter of '37 when comparison is made with last 3 months of '36.

Company is calling for redemption its 12,301 shares of 6% cumulative preferred stock at 103, requiring a cash outlay of $1,267,000. This has been made possible by a gain in the company's cash position to $6,365,159 as of Dec. 31, '37, compared with $3,968,749 at the end of '36.

Sulfur shipments held up relatively well during the period, in spite of the decline in general business activity. Cuban American Manganese contributed profits equivalent to about 33c a share on Freeport common stock.

Preliminary report of Freeport Sulphur and subsidiaries for year ended Dec. 31 shows net profit of $2,703,742 after depreciation, depletion, federal taxes, etc. This net profit is equal after 6% preferred dividend requirements, to $3.30 a share on 796,381 shares of common, comparing with $2,009,784 or $2.43 a common share in '36.

Freeport's proportionate share of net income of Cuban-American Manganese Corp. for year 1937 was $261,052, or 33c a share on common stock, compared with a net loss in '36 of $191,185.

Net profit of Freeport Sulphur for quarter ended Dec. 31, '37, was $724,383 or 89c a common share, against $499,273 or 61c a share in final quarter of '36.

Atlas Sales Up 9.4%

Annual financial statement for 1937 released by Atlas Powder shows a net income of $1,433,871 after taxes and charges. This is equivalent after preferred dividends to $4.40 a share on 248,145 shares of no par common stock. Net income for the preceding year was $1,430,080, equal to $4.21 each on 248,666 common shares outstanding at the close of '36.

Sales in '37 amounted to $17,385,515, a gain of 9.4% over '36. Last year sales of explosive products increased 7.9% and sales of cellulose products, consisting of coated fabrics and industrial finishes, were 11.9% higher.

In reviewing the progress of the company in the 25 years of its corporate existence, President Lyon states original outstanding capitalization of $6,000,000 had been increased to $23,365,070, including surplus; personnel from 603 to 2,385 and the assets from $6,000,000 to $24,922,500.

Hercules Reports $3.23 a Share

Due largely to inventory adjustments taken in the final quarter of last year, coupled with the general business decline, earnings of Hercules Powder for 1937 showed only a small gain over the preceding year. Net for the year was $4,440,273 equal after preferred dividends to $3.23 a share on the average of 1,212,240 shares outstanding against $4,284,164 or $3.17 a share on a comparable basis in 1936. Current volume is now 29% below average volume in 1937.

Declines in the market value of rosin used in the manufacture of paper size, and of raw cotton linters used in making nitrocellulose were mainly responsible for an inventory write-down of $712,134 which reduced net in the final quarter of $156,451 against $1,352,715 in the 4th quarter of '36.

In his remarks to stockholders, R. H. Dunham, president, states that while physical volume increased 11% last year, this was not fully reflected in profits due to higher raw material prices, wages and taxes.

$1,150,000 for Research

Approximately $1,150,000 was spent on experimental work during the year. Work in connection with Hercules' regular products accounted for a considerable portion of this amount. However, a substantial sum was spent in the exploration and development of new products and processes.

AAC Earnings Off Slightly

Report of American Agricultural Chemical of Delaware and subsidiaries, for the 6 months ended Dec. 31, 1937, shows net profit of $132,647, after depreciation, depletion, reserve for self-insurance, federal income taxes, etc., equivalent to 63c a share on 210,931 no-par shares of capital stock. No provision was made for federal surtax on undistributed profits. This compares with $161,694, or 76c a share, for the 6 months ended Dec. 31, '36.

Special 50c Dividend

A special dividend of 50c has been voted on stock of Chickasha Cotton Oil. This is the first payment since a similar disbursement was made on July 1, '36.

Option Not Exercised

N. Y. Curb Exchange has received notice from Fansteel Metallurgical that the option granted to Robert J. Aitchison, president, to purchase 10,000 shares of unissued common stock at $5 a share was not exercised by the expiration date, Dec. 31, '37, and has been extended until Dec. 31, '39.

Prices Current

Heavy Chemicals, Coal-tar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Petroleum Solvents and Chemicals, Naval Stores, Fats and Oils, etc.

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Import chemicals are so designated. Resale stocks when a market factor are quoted in addition to maker's prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f. o. b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1937 Average $1.10 - Jan. 1937 $1.11 - January 1938 $1.20

		Current Market	1938 Low	1938 High	1937 Low	1937 High
Acetaldehyde, drs, c-l wks	lb.	...	.14	...	.14	... .14
Acetaldol, 95%, 50 gal drs wks	lb.	.21	.25	.21	.25	.21 .25
Acetamide, tech, lcl kegs	lb.	.32	.43	.32	.43	.32 .43
Acetanalid, tech, 150 lb bbls	lb.	...	.29	...	.29	.24 .29
Acetic Anhydride, drs, f.o.b. wks, frt all'd	lb.	.10½	.11	.10½	.11	.13 .15
Acetin, tech, drs	lb.	...	.33	...	.33	.22 .33
Acetone, tks, f.o.b. wks, frt all'd	lb.	...	.04¾	...	.04¾	.04¾ .06½
drs, c-l, f.o.b. wks, frt all'd	lb.	...	.05¾	...	.05¾	.05¾ .07½
Acetyl chloride, 100 lb cbys	lb.	.55	.68	.55	.68	.55 .68
ACIDS						
Abietic, kgs, bbls	lb.	.09¾	.10	.09¾	.10	.06¾ .10
Acetic, 28%, 400 lb bbls, c-l, wks 100 lbs.		...	2.23	...	2.23	2.23 2.53
glacial, bbls, c-l, wks 100 lbs.		...	7.62	...	7.62	7.62 8.70
glacial, USP, bbls, c-l, wks 100 lbs		...	10.25	...	10.25	10.50 12.43
Acetylsalicylic, USP, 225 lb bbls	lb.	...	.60	...	.60	.50 .60
Adinic, kgs, bbls	lb.	...	.72	...	.72	... .72
Anthranilic, ref'd, bbls	lb.	1.15	1.20	1.15	1.20	.85 1.00
tech, bbls	lb.		.75		.75	.75
Battery, cbys, wks 100 lbs.		1.60	2.55	1.60	2.55	1.35 2.60
Benzoic, tech, 100 lb kgs	lb.	.43	.47	.43	.47	.43 .47
USP, 100 lb kgs	lb.	.54	.59	.54	.59	.54 .59
Boric, tech, gran, 80 tons, bgs, delv	ton *a*	...	95.00	...	95.00	... 95.00
Broenner's, bbls	lb.		1.11		1.11	1.11
Butyric, edible, c-l, wks, cbys	lb.	1.20	1.30	1.20	1.30	1.20 1.30
synthetic, c-l, drs, wks	lb.	...	.22	...	.22	... .22
wks, lcl	lb.	...	.23	...	.23	... .23
tks, wks	lb.	...	.21	...	.21	... .21
Camphoric, drs	lb.	5.50	5.70	5.50	5.70	5.50 5.70
Chicago, bbls	lb.	...	2.10	...	2.10	... 2.10
Chlorosulfonic, 1500 lb drs, wks	lb.	.03½	.05	.03½	.05	.03½ .05
Chromic, 99¾%, drs, delv	lb.	.15¼	.17¼	.15¼	.17¼	.15¼ .16¾
Citric, USP, crys, 230 lb bbls	lb. *b*	.24	.25	.24	.25	.24 .26
anhyd, gran, bbls	lb. *b*		.26½		.26½	.26½ .29
Cleve's, 250 lb bbls	lb.	.50	.52	.50	.52	.50 .52
Cresylic, 99%, straw, HB, drs, wks, frt equal	gal.	.89	.91	.89	.91	.72 .91
99%, straw, LB, drs, wks, frt equal	gal.	.92	.94	.92	.94	.77 .94
resin grade, drs, wks, frt equal	lb.	.10¾	.11¼	.10¾	.11¼	.09 .11¼
Crotonic, drs	lb.	.75	1.00	.75	1.00	.75 1.00
Formic, tech, 140 lb drs	lb.	.10½	.11½	.10½	.11½	.10½ .13
Fumaric, bbls	lb.	...	.60	...	.60	... .60
Fuming, see Sulfuric (Oleum)						
Gallic, tech, bbls	lb.	.75	.79	.75	.79	.65 .75
USP, bbls	lb.	.87	.91	.87	.91	.77 .91
Gamma, 225 lb bbls, wks	lb.	...	.85	...	.85	... .85
H, 225 lb bbls, wks	lb.	.50	.55	.50	.55	.50 .55
Hydriodic, USP, 10% sol, cbys	lb.	.50	.51	.50	.51	.50 .51
Hydrobromic, 34% conct 155 lb cbys, wks	lb.	.42	.44	.42	.44	.40 .42
Hydrochloric, see muriatic						
Hydrocyanic, cyl, wks	lb.	.80	1.30	.80	1.30	.80 1.30
Hydrofluoric, 30%, 400 lb bbls, wks	lb.	.07	.07½	.07	.07½	.07 .07½
Hydrofluosilicic, 35%, 400 bbls, wks	lb.	.10½	.15	.10½	.15	.10½ .15
Lactic, 22%, dark, 500 lb bbls	lb.	.02½	.02¾	.02½	.02¾	.02½ .02¾
22%, light ref'd, bbls	lb.	.03½	.03¾	.03½	.03¾	.03½ .03¾
44%, light, 500 lb bbls	lb.	.05½	.05¾	.05½	.05¾	.05½ .05¾
44%, dark, 500 lb bbls	lb.	.06½	.06¾	.06½	.06¾	.06½ .06¾
50%, water white, 500 lb bbls	lb.	.10½	.11½	.10½	.11½	.10½ .11½
USP X, 85%, cbys	lb	.42	.45	.42	.45	.42 .50
Lauric, drs	lb.	.08½	.09	.08½	.09	... ...
Laurent's, 250 lb bbls	lb.	.45	.46	.45	.46	.45 .46
Linoleic, bbls	lb.	...	.20	...	.20	.16 .20
Maleic, powd, kgs	lb.	.30	.40	.30	.40	.29 .40
Malic, powd, kgs	lb.	.45	.60	.45	.60	.45 .60
Metanillic, 250 lb bbls	lb.	.60	.65	.60	.65	.60 .65
Mixed, tks, wks N unit		.06½	.07¼	.06½	.07¼	.06½ .07¼
S unit		.008	.009	.008	.009	.008 .009
Monochloracetic, tech, bbls	lb.	.16	.18	.16	.18	.16 .18
Monosulfonic, bbls	lb.	1.50	1.60	1.50	1.60	1.50 1.60
Muriatic, 18°, 120 lb cbys, c-l, wks 100 lb.		...	1.50	...	1.50	1.35 1.50
tks, wks 100 lb.		...	1.00	...	1.00	1.00
20°, cbys, c-l, wks 100 lb.		...	1.75	...	1.75	1.45 1.75
tks, wks 100 lb.		...	1.10	...	1.10	1.10
22°, c-l, cbys, wks 100 lb.		...	2.25	...	2.25	1.95 2.25
tks, wks 100 lb		...	1.60	...	1.60	1.60
CP, cbys	lb.	.06½	.07⅛	.06½	.07⅛	.06½ .07⅛
N & W, 250 lb bbls	lb.	.85	.87	.85	.87	.85 .87
Naphthenic, 240-280 s.v., drs	lb.	.10	.13	.10	.13	.10 .14
Sludges, drs	lb.		.05		.05	.05 .10
Naphthionic, tech, 250 lb bbls	lb.	.60	.65	.60	.65	.60 .65
Nitric, 36°, 135 lb cbys, c-l, wks 100 lb. *c*		...	5.00	...	5.00	... 5.00
38°, c-l, cbys, wks 100 lb. *c*		...	5.50	...	5.50	... 5.50
40°, cbys, c-l, wks 100 lb. *c*		...	6.00	...	6.00	... 6.00
42°, c-l, cbys, wks 100 lb. *c*		...	6.50	...	6.50	... 6.50
CP, cbys, delv	lb.	.11½	.12½	.11½	.12½	.11½ .12½
Oxalic, 300 lb bbls, wks, or N Y	lb.	.10¾	.12	.10¾	.12	.10¾ .12
Phosphoric, 85%, USP, cbys	lb.	.12	.14	.12	.14	.12 .14
50%, acid, c-l, drs, wks	lb.	.06	.08	.06	.08	.06 .08
75%, acid, c-l, drs, wks	lb.	.09	.10½	.09	.10½	.09 .10½
Picramic, 300 lb bbls, wks	lb.	.65	.70	.65	.70	.65 .70
Picric, kgs, wks	lb.	.35	.40	.35	.40	.35 .40
Propionic, 98% wks, drs	lb.		.22		.22	.20 .22
80%	lb.	.16	.17½	.16	.17½	.16 .17½
Pyrogallic, tech, lump, pwd, bbls	lb.		1.05		1.05	
cryst, USP	lb.	1.45	1.63	1.45	1.63	1.30 1.48
Ricinoleic, bbls	lb.	...	.38	...	.38	.35 .38
tech, bbls	lb.	...	.13	...	.13	... ...
Salicylic, tech, 125 lb bbls, wks	lb.	...	.33	...	.33	... .33
USP, bbls	lb.	.40	.45	.40	.45	... ...
Sebacic, tech, drs, wks	lb.	.37	.41	.37	.41	.37 .41
Succinic, bbls	lb.		.75	...	.75	... .75
Sulfanilic, 250 lb bbls, wks	lb.	.17	.18	.17	.18	.17 .18
Sulfuric, 60°, tks, wks	ton	...	13.00	...	13.00	12.00 13.00
c-l, cbys, wks 100 lb.		...	1.25	...	1.25	1.10 1.25
66°, tks, wks	ton	...	16.50	...	16.50	15.50 16.50
c-l, cbys, wks 100 lb.		...	1.50	...	1.50	1.35 1.50
CP, cbys, wks	lb.	.06½	.07½	.06½	.07½	.06½ .07½
Fuming (Oleum) 20% tks, wks	ton		18.50		18.50	... 18.50
Tannic, tech, 300 lb bbls	lb.	.40	.47	.40	.47	.19 .47
Tartaric, USP, gran, powd, 300 lb bbls	lb.	.24¼	.24¾	.24¼	.24¾	.21¾ .25¼
Tobias, 250 lb bbls	lb.	.65	.67	.65	.67	.65 .67
Trichloroacetic bottles	lb.	2.00	2.50	2.00	2.50	2.00 2.50
kgs	lb.		1.75		1.75	1.75
Tungstic, tech, bbls	lb.	no price				
Vanadic, drs, wks	lb.	1.10	1.20	1.10	1.20	1.10 1.20
Albumen, light flake, 225 lb bbls	lb.	.52	.60	.52	.60	.47 .60
dark, bbls	lb.	.11	.15	.11	.15	.11 .17
egg, edible	lb.	1.10	1.15	1.05	1.15	.76 1.15
vegetable, edible	lb.	.74	.78	.74	.78	.76 .78
Alcohol, Amyl (from Pentane) tks, delv	lb.	...	.123	...	.123	... .123
c-l, drs, delv	lb.	...	.133	...	.133	... .133
lcl, drs, delv	lb.	...	.143	...	.143	... .143
Amyl, secondary, tks, delv	lb.	...	.08½	...	.08½	... .08½
drs, c-l, delv E. of Rockies	lb.	...	.09½	...	.09½	... ...
Benzyl, cans	lb.	.68	1.00	.68	1.00	.65 1.10
Butyl, normal, tks, f.o.b. wks, frt all'd	lb. *d*	...	.09	...	.09	.08½ .09
c-l, drs, f.o.b. wks, frt all'd	lb. *d*	...	.10	...	.10	.09½ .10
Butyl, secondary, tks, delv	lb. *d*	...	.06	...	.06	.06 .07
c-l, drs, delv	lb. *d*	...	.07	...	.07	.07 .08
Capryl, drs, tech wks	lb.		.85		.85	.85
Cinnamic, bottles	lb.	2.00	2.50	2.00	2.50	2.00 3.65
Denatured, CD, No. 11, 12, 13, c-l, drs, wks	gal. *e*	...	.35	...	.35	.33 .35
tks, East, wks	gal.	...	.29	...	.29	... ...
Western schedule, c-l, drs, wks	gal. *e*	...	.28	...	.28	.37 .39
Denatured, SD, No. 1, tks		...	.27	...	.27	.26 .27
c-l, drs, wks	gal. *e*	...	.33	...	.33	.32 .33

a Powdered boric acid $5 a ton higher in each case; USP $15 higher; *b* Powdered citric is ½c higher; kegs are in each case ½c higher than bbls.; *y* Price given is per gal.

c Yellow grades 25c per 100 lbs. less in each case; *d* Spot prices are 1c higher; *e* Anhydrous is 5c higher in each case; *f* Pure prices are 1c higher in each case.

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

		Current Market	1938 Low	1938 High	1937 Low	1937 High
Alcohols (continued):						
Diacetone, pure, c-l, drs, delv	lb. *f*	.11½	.11½	.11½		.11½
tech, contract, drs, c-l, delv	lb.	.10½	.10½	.10½		
Ethyl, 190 proof, molasses, tks	gal *g*	4.06		4.06	4.05	4.07
c-l. drs	gal. *g*	4.12		4.12	4.11	4.12
c-l, bbls	gal. *g*	4.13		4.13	4.12	4.13
absolute, drs	gal. *g*	4.42	4.47	4.42	4.47	4.54 6.08½
Furfuryl, tech, 500 lb drs	lb.	.30	.35	.30	.35	.30 .35
Hexyl, secondary tks, delv	lb.		.12		.12	.11½ .12
c-l, drs, delv	lb.		.13		.13	.12½ .13
Normal, drs, wks	lb.	3.25	3.50	3.25	3.50	3.25 3.50
Isoamyl, prim, cans, wks	lb.		.32		.32	.32
drs, lcl, delv	lb.		.27		.27	.27
Isobutyl, ref'd, lcl, drs	lb.		.10		.10	.10
c-l, drs	lb.		.09½		.09½	.09½
tks	lb.		.08½		.08½	.08½
Isopropyl, ref'd, 91%, c-l, drs, f.o.b. wks, frt all'd	lb.		.36		.36	.39½ .45
Ref'd 98%, drs. f.o.b. wks, frt all'd	gal.		.41		.41	
Tech 91%, drs, above terms	gal.		.33½		.33½	
tks, same tech	gal.		.28½		.28½	
Tech 98%, drs, above terms	gal.		.37½		.37½	
tks, above terms	gal.		.32½		.32½	
Spec Solvent, tks, wks	gal.		.28		.28	.27 .28
Aldehyde ammonia, 100 gal drs	lb.	.80	.82	.80	.82	.80 .82
Alphanaphthol, crude, 300 lb bbls	lb.		.52		.52	.52
Alphanaphthylamine, 350 lb bbls	lb.	.32	.34	.32	.34	.32 .34
Alum, ammonia, lump, c-l, bbls, wks	100 lb.	3.40	3.65	3.40	3.65	3.00 3.25
delv NY, Phila	100 lb.		3.40		3.40	3.15 3.40
Granular, c-l, bbls. wks	100 lb.	3.15	3.40	3.15	3.40	2.75 3.00
Powd, c-l, bbls, wks	100 lb.		3.55		3.55	3.15 3.40
Chrome, bbls	100 lb.	6.50	6.75	6.50	6.75	6.50 7.25
Potash, lump, c-l, bbls, wks	100 lb.	3.65	3.90	3.65	3.90	3.25 3.50
Granular, c-l, bbls, wks	100 lb.	3.40	3.65	3.40	3.65	3.00 3.25
Powd, c-l, bbls, wks	100 lb.	3.80	4.05	3.80	4.05	3.40 3.65
Soda, bbls, wks	100 lb.		3.25		3.25	3.25
Aluminum metal, c-l, NY	100 lb.		20.00		20.00	19.00 20.00
Acetate, CP, 20%, bbls	lb.	.09	.10	.09	.10	.09 .10
Chloride anhyd, 99%, wks	lb.	.07	.12	.07	.12	.07 .12
93%, wks	lb.	.05	.08	.05	.08	.05 .08
Crystals, c-l, drs, wks	lb.	.06	.06¼	.06	.06¼	.06 .06¼
Solution, drs, wks	lb.	.02¾	.03¼	.02¾	.03¼	.02¾ .03¼
Hydrate, 96%, light, 90 lb bbls, delv	lb.	.12	.13	.12	.13	.13 .15
heavy, bbls, wks	lb.	.029	.03½	.029	.03½	.029 .03½
Oleate, drs	lb.	.16¾	.18½	.16¾	.18½	.16¾ .18½
Palmitate, bbls	lb.		.23		.23	.22 .23
Resinate, pp., bbls	lb.		.15		.15	.15
Stearate, 100 lb bbls	lb.	.19	.21	.19	.21	.19 .21
Sulfate, com, c-l, bgs, wks	100 lb.		1.35		1.35	1.35
c-l, bbls, wks	100 lb.		1.55		1.55	1.55
Sulfate, iron-free, c-l, bgs, wks	100 lb.		2.00		2.00	1.90
c-l, bbls, wks	100 lb.		2.20		2.20	2.05
Aminoazobenzene, 110 lb kgs	lb.		1.15		1.15	1.15
Ammonia anhyd fert com, tks	lb.	.04½	.05½	.04½	.05½	.04½ .05½
Ammonia anhyd, 100 lb cyl	lb.	.16	.22	.16	.22	.16 .22
26°, 800 lb drs, delv	lb.	.02¼	.02½	.02¼	.02½	.02¼ .02½
Aqua 26°, tks, NH	cont.		.05		.05	.04½ .05
tk wagon	lb.		.02		.02	.02
AMMONIUM						
Ammonium Acetate, kgs	lb.	.26	.33	.26	.33	.26 .33
Bicarbonate, bbls, f.o.b. wks	100 lb.	5.15	5.71	5.15	5.71	5.15 5.71
Bifluoride, 300 lb bbls	lb.	.16	.17	.16	.17	.16 .17
carbonate, tech, 500 lb bbls	lb.	.08	.12	.08	.12	.08 .12
Chloride, White, 100 lb bbls, wks	100 lb.	4.45	4.90	4.45	4.90	4.45 4.90
Gray, 250 lb bbls, wks	100 lb.	5.50	6.25	5.50	6.25	5.00 6.25
Lump, 500 lbs cks spot	lb.	.10½	.11	.10½	.11	.10½ .11
Lactate, 500 lb bbls	lb.	.15	.16	.15	.16	.15 .16
Laurate, bbls	lb.		.23		.23	
Linoleate, 80% anhyd, bbls	lb.		.15		.15	.11 .15
Naphthenate, bbls	lb.		.17		.17	
Nitrate, tech, cks	lb.	.038	.0405	.038	.0405	.03¾ .04
Oleate, drs	lb.		.15		.15	.15 .10
Oxalate, neut, cryst, powd, bbls	lb.	.19	.20	.19	.22½	.22½ .23
Perchlorate, kgs	lb.		.16		.16	.16
Persulfate, 112 lb kgs	lb.	.21	.24	.21	.24	.21 .24
Phosphate, dibasic tech, powd, 325 lb bbls	lb.	.07½	.10	.07½	.10	.07½ .10
Ricinoleate, bbls	lb.		.15		.15	
Stearate, anhyd, bbls	lb.		.24		.24	
Paste, bbls	lb.		.07½		.07½	
Sulfate, dom, f.o.b., bulk	ton		28.50		28.50	26.00 28.00
200 lb bgs	ton		29.80		29.80	29.30
100 lb bgs	lb.		30.50		30.50	30.00
Sulfocyanide, pure, kgs	lb.		.55		.55	.55

g Grain alcohol 20c a gal. higher in each case.

		Current Market	1938 Low	1938 High	1937 Low	1937 High
Amyl Acetate (from pentane) tks, delv	lb.	.11½	.11½	.11½		.11½
tech, drs, delv	lb.	.12		.12	.11½	.13½
Secondary, tks, delv	lb.	.08½		.08½		.08½
c-l, drs, delv	lb.	.09½		.09½		.09½
tks, delv	lb.	.08½		.08½		.08½
Chloride, norm, drs, wks	lb. .56	.68	.56	.68	.56	.68
mixed, drs, wks	lb. .07	.077	.07	.077	.07	.077
tks, wks	lb.	.06		.06		.06
Mercaptan, drs, wks	lb.	1.10		1.10		1.10
Oleate, lcl, wks, drs	lb.	.25		.25		.25
Stearate, lcl, wks, drs	lb.	.26		.26		.26
Amylene, drs, wks	lb. .102	.11	.102	.11	.102	.11
tks, wks	lb.	.09		.09		.09
Aniline Oil, 960 lb drs and tks	lb. .14½	.17½	.14½	.17½	.15	.17½
Annatto fine	lb. .34	.37	.34	.37	.34	.37
Anthracene, 80%	lb.	.75		.75		.75
40%	lb.	.18		.18		.18
Anthraquinone, sublimed, 125 lb bbls	lb.	.65		.65	.50	.65
Antimony metal slabs, ton lots	lb. .13¾	.14	.13¾	.14	.13⅝	.17¼
Butter of, see Chloride.						
Chloride, soln cbys	lb.	.17		.17		.17
Needle, powd, bbls	lb. .14	.16	.14	.16	.14	.19½
Oxide, 500 lb bbls	lb. .12½	.13	.12½	.16½	.14¼	.16½
Salt, 63% to 65%, tins	lb. .26	.27	.26	.27	.22	.24
Sulfuret, golden, bbls	lb. .22	.23	.22	.23	.22	.23
Archil, conc, 600 lb bbls	lb. .21	.27	.21	.27	.21	.27
Double, 600 lb bbls	lb. .18	.20	.18	.20	.18	.20
Aroclors, wks	lb. .18	.30	.18	.30	.18	.30
Arrowroot, bbl	lb. .08½	.09	.08½	.09	.08½	.09¾
Arsenic, Metal	lb. .42	.44	.42	.44	.42	.44
Red, 224 lb cs kgs	lb.	.15¾		.15¾		.15¾
White, 112 lb kgs	lb. .03	.04	.03	.04	.03	.04
Barium Carbonate precip, 200 lb bgs, wks	ton 52.50	62.50	52.50	62.50	52.50	62.50
Nat (witherite) 90% gr, c-l, wks, bgs	ton	44.00		44.00	42.00	45.00
Chlorate, 112 lb kgs, NY	lb. .16½	.17½	.16½	.17½	.16½	.17½
Chloride, 600 lb bbls, delv, zone 1	ton 77.00	92.00	77.00	92.00	74.00	92.00
Dioxide, 88%, 690 lb drs	lb. .11	.12	.11	.12	.11	.12
Hydrate, 500 lb bbls	lb. .04¾	.05½	.04¾	.05½	.04¾	.05½
Nitrate, bbls	lb. .07	.08¼	.07	.08¼	.07	.08¼
Barytes, floated, 350 lb bbls c-l, wks	ton	23.65		23.65		23.65
Bauxite, bulk, mines	ton 7.00	10.00	7.00	10.00	7.00	10.00
Bentonite, c-l, 325 mesh, bgs, wks	ton	16.00		16.00		16.00
200 mesh	ton	11.00		11.00		11.00
Benzaldehyde, tech, 945 lb drs, wks	lb. .60	.62	.60	.62	.60	.62
Benzene (Benzol), 90%, Ind, 8000 gal tks, ft all'd	gal.	.16		.16		.16
90% c-l, drs	gal.	.21		.21		.21
Ind pure, tks, frt all'd	gal.	.16		.16		.16
Benzidine Base, dry, 250 lb bbls	lb. .70	.72	.70	.72	.70	.72
Benzoyl Chloride, 500 lb drs	lb. .40	.45	.40	.45	.40	.45
Benzyl Chloride, 95-97% rfd, drs	lb. .30	.40	.30	.40	.30	.40
Tech, drs	lb. .25	.26	.25	.26	.25	.26
Beta-Naphthol, 250 lb bbl, wks	lb. .23	.24	.23	.24	.23	.24
Naphthylamine, sublimed, 200 lb bbls	lb. 1.25	1.35	1.25	1.35	1.25	1.35
Tech, 200 lb bbls	lb. .51	.52	.51	.52	.51	.52
Bismuth metal	lb. 1.00	1.10	1.00	1.10	1.00	1.10
Chloride, boxes	lb. 3.20	3.25	3.20	3.25	3.20	3.25
Hydroxide, boxes	lb. 3.15	3.20	3.15	3.20	3.15	3.20
Oxychloride, boxes	lb.	2.95		2.95	2.75	3.04
Subbenzoate, boxes	lb. 3.25	3.30	3.25	3.30	3.25	3.30
Subcarbonate, kgs	lb. 1.23	1.58	1.23	1.58	1.23	1.58
Trioxide, powd, boxes	lb.	3.57		3.57	3.45	3.57
Subnitrate	lb. 1.22	1.48	1.22	1.48	1.22	1.48
Blackstrap, cane (see Molasses, Blackstrap).						
Blanc Fixe, 400 lb bbls, wks	ton *h* 40.00	75.00	40.00	75.00	40.00	75.00
Bleaching Powder, 800 lb drs, c-l, wks, contract	100 lb.	2.00		2.00		2.00
lcl, drs, wks	lb. 2.25	3.60	2.25	3.60	2.25	3.60
Blood, dried, f.o.b., NY	unit	3.10		3.10	3.10	4.30
Chicago, high grade	unit	3.35	3.10	3.35	3.00	4.65
Imported shipt	unit	3.45	3.35	3.45	3.25	4.10
Blues, Bronze Chinese Milori						
Prussian Soluble	lb. .36	.37	.36	.37	.36	.37
Ultramarine,* dry, wks, bbls	lb.	.11		.11	.10	.11
Regular grade, group 1	lb.	.16		.16	.15	.16
Special, group 1	lb.	.19		.19	.18	.19
Pulp, No. 1	lb.	.27		.27	.26	.27
Bone, 4½ + 50% raw, Chicago	ton 26.00	29.00	26.00	30.00	26.00	30.00
Bone Ash, 100 lb kgs	lb. .06	.07	.06	.07	.06	.07
Black, 200 lb bbls	lb. .06½	.08¼	.06½	.08¼	.05½	.08¼
Meal, 3% & 50%, imp	ton	23.50	23.50	23.75	23.75	27.50
Domestic, bgs, Chicago	ton 19.00	21.00	19.00	22.00	19.00	27.00
Borax, tech, gran, 80 ton lots, sacks, delv	ton *i*	42.00		42.00	40.00	42.00
bbls, delv	ton *i*	52.00		52.00	50.00	52.00
Tech, powd, 80 ton lots, sacks	ton *i*	47.00		47.00	45.00	47.00
bbls, delv	ton *i*	57.00		57.00	56.00	57.00
Bordeaux Mixture, drs	lb. .11	.11½	.11	.11½	.10½	.11

h Lowest price is for pulp, highest for high grade precipitated; *i* Crystals $6 per ton higher; USP, $15 higher in each case; * Freight is equalized in each case with nearest producing point.

Bromine
Coal Tar

Prices

		Current Market		1938 Low	1938 High	1937 Low	1937 High
Bromine, cases	lb.	.30	.43	.30	.43	.30	.43
Bronze, Al, pwd, 300 lb drs	lb.	.90½	.92½	.90½	.92½	.80	1.50
Gold, blk	lb.	.45	.65	.45	.65	.40	.65
Butanes, com 16-32° group 3 tks	lb.	.02¼	.03¾	.02¼	.03¾	.02¼	.03¾
Butyl, Acetate, norm drs, frt allowed	lb.	.10	.10½	.10	.10½	.10	.10½
tks, frt allowed	lb.	...	.09	...	.09	...	.09
Secondary, tks, frt allowed	lb.	...	.07	...	.07	.07	.07½
drs, frt, allowed	lb.	.08	.08½	.08	.08½	.08	.09
Aldehyde, 50 gal drs, wks	lb.	.16½	.17½	.16½	.17½	.16½	.17½
Carbinol, norm drs, wks	lb.	.60	.75	.60	.75	.60	.75
Lactate	lb.	.22½	.23½	.22½	.23½	.22½	.23½
Oleate, drs, frt allowed	lb.	...	.25	...	.25	...	.25
Propionate, drs	lb.	.18	.18½	.18	.18½	.18	.18½
tks, delv	lb.	...	.17	...	.17	...	.17
Stearate, 50 gal drs	lb.	...	.26	...	.26	.25	.26
Tartrate, drs	lb.	.55	.60	.55	.60	.55	.60
Butyraldehyde, drs, lcl, wks	lb.	...	.35½	...	.35½	...	.35½
Cadmium Metal	lb.	...	1.35	1.35	1.60	1.05	1.60
Sulfide, orange, boxes	lb.	1.50	1.60	1.50	1.60	.90	1.60
CALCIUM							
Calcium, Acetate, 150 lb bgs c-l, delv	100 lb.	...	1.65	...	1.65	1.65	2.25
Arsenate, c-l, E. of Rockies, dealers, drs	lb.	.06¾	.07¼	.06¾	.07¼	.06¼	.07¾
Carbide, drs	lb.	.05	.06	.05	.06	.05	.06
Carbonate, tech, 100 lb bgs c-l	lb.	...	1.00	...	1.00	...	1.00
Chloride, flake, 375 lb drs, burlap bgs, c-l, delv	ton	...	23.50	...	23.50	22.00	23.50
paper bgs, c-l, delv	ton	23.00	36.00	23.00	36.00	...	...
Solid, 650 lb drs, c-l, delv	ton	...	21.50	...	21.50	20.00	21.50
Ferrocyanide, 350 lb bbls wks	lb.	...	.17	...	.17	...	.17
Gluconate, Pharm, 125 lb bbls	lb.	.50	.57	.50	.57	.50	.57
Nitrate, 100 lb bgs	ton	...	28.00	...	28.00	26.10	28.00
Palmitate, bbls	lb.	.22	.23	.22	.23	.22	.23
Phosphate, tribasic, tech, 450 lb bbls	lb.	.06½	.07½	.06½	.07½	.06½	.07½
Resinate, precip, bbls	lb.	.13	.14	.13	.14	.13	.14
Stearate, 100 lb bbls	lb.	.19	.21	.19	.21	.19	.21
Camphor, slabs	lb.	.55	.56	.55	.56	.54	.56
Powder	lb.	.55	.56	.55	.56	.54	.56
Camwood, Bk, ground bbls	lb.	.16	.18	.16	.18	.16	.18
Carbon Bisulfide, 500 lb drs	lb.	.05	.05¾	.05	.05¾	.05	.05¾
Black, c-l, bgs, delv, price varying with zone†	lb.	.027	.0380	.027	.0380	.0320	.0535
lcl, bgs, f.o.b. whse	lb.	...	.05¾	...	.05¾	.06½	.07
cartons, f.o.b. whse	lb.	...	.06¼	...	.06¼	.07	.07¾
cases, f.o.b. whse	lb.	...	.07	...	.07	.07¾	.08¼
Decolorizing, drs, c-l	lb.	.08	.15	.08	.15	.08	.15
Dioxide, Liq 20-25 lb cyl	lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, 55 or 110 gal drs, c-l, delv	lb.	.05¼	.06	.05¼	.06	.05¼	.06
Casein, Standard, Dom, grd	lb.	.10	.12½	.10	.13½	.11	.20¾
80-100 mesh, c-l, bgs	lb.	.10½	.13	.10½	.14	.11½	.21¼
Castor Pomace, 5½ NH_3, c-l, bgs, wks	ton	...	21.00	...	21.00	21.00	25.00
Imported, ship, bgs	ton	...	21.00	...	21.00	nom.	17.00
Celluloid, Scraps, ivory cs	lb.	.12	.15	.12	.15	.12	.15
Transparent, cs	lb.	...	.20	...	.20	...	.20
Cellulose, Acetate, 50 lb kgs	lb.	...	.40	...	.40	.40	.55
Chalk, dropped, 175 lb bbls	lb.	.03	.03¾	.03	.03¾	.03	.03¾
Precip, heavy, 560 lb cks	lb.	.03	.04	.03	.04	.03	.04
Light, 250 lb cks	lb.	.03¼	.04	.03¼	.04	.03	.04
Charcoal, Hardwood, lump, blk, wks	bu.	...	.15	...	.15	...	.15
Softwood, bgs, delv*	ton	23.00	34.00	23.00	34.00	23.00	34.40
Willow, powd, 100 lb bbl, wks	lb.	.06	.07	.06	.07	.06	.07
Chestnut, clarified, tks, wks	lb.	...	.02125	...	.02125	.01625	.02125
25%, bbls, wks	lb.	...	.0225	...	.0225	.02	.0225
Pwd, 60%, 100 lb bgs, wks	lb.	...	.04⅞	...	.04⅞	...	.04⅞
China Clay, c-l, blk mines	ton	...	7.00	...	7.00	6.50	7.00
Imported, lump, blk	ton	22.00	25.00	22.00	25.00	22.00	25.00
Chlorine, cyls, lcl, wks, contract	lb.	.07½	.08½	.07½	.08½	.07½	.08½
cyls, c-l, contract	lb. *j*	...	.05½	...	.05½	...	.05½
Liq, tk, wks, contract 100 lb.		...	2.15	...	2.15	...	2.15
Multi, c-l, cyls, wks, cont	lb.	2.30	2.55	2.30	2.55	2.30	2.55
Chloroacetophenone, tins, wks	lb.	3.00	3.50	3.00	3.50	3.00	3.50
Chlorobenzene, Mono, 100 lb drs, lcl, wks	lb.	.06	.07½	.06	.07½	.06	.07½
Chloroform, tech, 1000 lb drs	lb.	.20	.21	.20	.21	.20	.21
USP, 25 lb tins	lb.	.30	.31	.30	.31	.30	.31
Chloropicrin; comml cyls	lb.	...	.80	...	.80	...	.80
Chrome, Green, CP	lb.	.21	.25	.21	.25	.20	.25
Yellow	lb.	.14½	.15½	.14½	.15½	.13	.16½
Chromium, Acetate, 8% Chrome, bbls	lb.	.05	.08	.05	.08	.05	.08
Fluoride, powd, 400 lb bbl	lb.	.27	.28	.27	.28	.27	.28
Coal tar, bbls	bbl.	7.50	8.00	7.50	8.00	6.75	9.00

j A delivered price; * Depends upon point of delivery; † New bulk price, tank cars ¼c per lb. less than bags in each zone.

Current

		Current Market		1938 Low	1938 High	1937 Low	1937 High
Cobalt Acetate, bbls	lb.	.66	.68	.66	.68	.58	.68
Carbonate tech, bbls	lb.	...	1.63	...	1.63	1.42¾	1.63
Hydrate, bbls	lb.	...	1.36	...	1.36	...	...
Linoleate, solid, bbls	lb.	...	.33	...	.33	.31	.33
paste, 6%, drs	lb.	...	.31	...	.31	...	.31
Oxide, black, bgs	lb.	...	1.67	...	1.67	1.41	1.67
Resinate, fused, bbls	lb.	...	.13½	...	.13½	.13	.13½
Precipitated, bbls	lb.	...	.34	...	.34	.30½	.34
Cochineal, gray or bk bgs	lb.	.35	.38	.35	.38	.32	.38
Teneriffe silver, bgs	lb.	.36	.39	.36	.39	.33	.39
Copper, metal, electrol 100	lb.	...	10.00	10.00	11.00	11.00	16.25
Acetate, normal, bbls, c-l, wks	lb.	...	.23	...	.23	...	...
Carbonate, 400 lb bbls	lb.	...	.10¼	.10¼	.10½	.10½	.12½
52-54% bbls	lb.	.15¾	.16¾	.15¾	.16¾	.15¾	.19
Chloride, 250 lb bbls	lb.	.15	.17	.15	.17	.15	.18
Cyanide, 100 lb drs	lb.	.37	.38	.37	.38	.37	.38
Oleate, precip, bbls	lb.	...	.20	...	.20	...	.20
Oxide, black, bbls, wks	lb.	.14¾	.15¼	.14¾	.17½	.17	.18
red 100 lb bbls	lb.	...	.16¾	.16¼	.19775	.17	.19975
Resinate, precip, bbls	lb.	.15	.16	.15	.16	.15	.19
Stearate, precip, bbls	lb.	.23	.24	.23	.24	.23	.40
Sub-acetate verdigris, 400 lb bbls	lb.	.18	.19	.18	.19	.18	.19
Sulfate, bbls, c-l, wks 100	lb.	...	4.25	...	4.25	4.25	4.50
Copperas, crys and sugar bulk c-l, wks	ton	12.00	13.00	12.00	13.00	12 00	13.00
Corn Sugar, tanners, bbls 100	lb.	3.20	3.30	3.15	3.30	3.15	4.34
Corn Syrup, 42°, bbls 100	lb.	...	3.16	3.11	3.16	3.11	4.36
43°, bbls 100	lb.	...	3.21	3.16	3.21	3.16	4.41
Cotton, Soluble, wet, 100 lb bbls	lb.	.40	.42	.40	.42	.40	.42
Cream Tartar, USP, powd & gran, 300 lb bbls	lb.	.19¾	.20¼	.19¾	.20¼	.15	.20¼
Creosote, USP, 42 lb cbys	lb.	.45	.47	.45	.47	.45	.47
Oil, Grade 1, tks	gal.	.13½	.14	.13½	.14	.13	.14
Grade 2	gal.	.122	.132	.122	.132	.113	.132
Cresol, USP, drs	lb.	.12	.12½	.12	.12½	.10	.13
Crotonaldehyde, 98%, drs, wks	lb.	.26	.30	.26	.30	.26	.30
Cutch, Philippine, 100 lb bale	lb.	.04	.04¾	.04	.04¾	.04	.04¾
Cyanamid, bgs, c-l, frt allowed Ammonia	unit	...	1.15	...	1.15	1.10	1.15
Derris root 5% rotenone, bbls	lb.	.39	.43	.39	.43	.39	.47
Dextrin, corn, 140 lb bgs f.o.b., Chicago	100 lb.	3.55	3.75	3.50	3.75	3.50	5.00
British Gum, bgs	100 lb.	3.80	4.00	3.75	4.00	3.75	5.25
Potato, Yellow, 220 lb bgs	lb.	.07¾	.08¾	.07¾	.08¾	.07¾	.08¾
White, 220 lb bgs, lcl	lb.	.08	.09	.08	.09	.08	.09
Tapioca, 200 bgs, lcl	lb.	...	.0715	.0715	.08	...	.08
White, 140 lb bgs	100 lb.	3.50	3.70	3.45	3.70	4.00	4.58
Diamylamine, c-l, drs, wks	lb.	.47	.75	.47	.75	.47	.75
Diamylene, drs, wks	lb.	.095	.102	.095	.102	.095	.102
tks, wks	lb.	...	.08½	...	.08½	...	.08½
Diamylether, wks, drs	lb.	.085	.092	.085	.092	.085	.092
tks, wks	lb.	...	.075	...	.075	...	.075
Oxalate, lcl, drs, wks	lb.	...	.30	...	.30	...	.30
Diamylphthalate, drs, wks	lb.	.20½	.21	.20½	.21	.19	.21½
Diamyl Sulfide, drs, wks	lb.	...	1.10	...	1.10	...	1.10
Diatomaceous Earth, see Kieselguhr.							
Dibutoxy Ethyl Phthalate, drs, wks	lb.	...	.35	...	.35	...	.35
Dibutylamine, lcl, drs, wks	lb.	...	.55	...	.55	...	...
Dibutyl Ether, drs, wks, lcl	lb.	...	.30	...	.30	...	.30
Dibutylphthalate, drs, wks, frt all'd	lb.	...	.21	...	.21	.19½	.21
Dibutyltartrate, 50 gal drs	lb.	.45	.54	.45	.54	.35	.50
Dichlorethylene, drs	lb.	...	.25	...	.25	.25	.29
Dichloroethylether, 50 gal drs, wks	lb.	.15	.16	.15	.16	.15	.16
tks, wks	lb.	...	.14	...	.14	...	.14
Dichloromethane, drs, wks	lb.	...	.23	...	.23	...	.23
Dichloropentanes, drs, wks	lb.	no prices		...	...	...	...
tks, wks	lb.	no prices		...	...	...	...
Diethanolamine, tks, wks	lb.	...	.23	...	.23	.23	.25
Diethylamine, 400 lb drs	lb.	2.75	3.00	2.75	3.00	2.75	3.00
Diethylaniline, 850 lb drs	lb.	.40	.52	.40	.50	.40	.50
Diethyl Carbinol, drs	lb.	.60	.75	.60	.75	.60	.75
Diethylcarbonate, com drs	lb.	.31¾	.35	.31¾	.35	.31¾	.35
Diethylorthotoluidin, drs	lb.	.64	.67	.64	.67	.64	.67
Diethylphthalate, 1000 lb drs	lb.	.19	.19½	.19	.19½	.18	.19½
Diethylsulfate, tech, drs, wks, lcl	lb.	.13	.14	.13	.14	.13	.20
Diethyleneglycol, drs	lb.	.16	.17	.16	.17	.16	.23
Mono ethyl ethers, drs	lb.	.15	.16	.15	.16	.15	.17
tks, wks	lb.	...	.14	...	.14	.14	.15
Mono butyl ether, drs	lb.	.23	.24	.23	.24	.23	.26
tks, wks	lb.	...	.22	...	.22	...	...
Diethylene oxide, 50 gal drs, wks	lb.	.20	.24	.20	.24	.20	.24
Diglycol Oleate, bbls	lb.	...	.21	...	.21	.21	.24
Laurate, bbls	lb.	...	.27½	...	.27½	...	...
Stearate, bbls	lb.	...	.27½	...	.27½	...	...
Dimethylamine, 400 lb drs, pure 25 & 40% sol 100% basis	lb.	...	1.00	...	1.00	...	.95
Dimethylaniline, 340 lb drs	lb.	.26	.27	.26	.27	.26	.27
Dimethyl Ethyl Carbinol, drs	lb.	.60	.75	.60	.75	.60	.75
Dimethyl phthalate, drs, wks, frt allowed	lb.	...	.19	...	.19	.20½	.21
Dimethylsulfate, 100 lb drs	lb.	.45	.50	.45	.50	.45	.50
Dinitrobenzene, 400 lb bbls	lb. *k*	.16	.19	.16	.19	.16	.19
Dinitrochlorobenzene, 400 lb bbls	lb.	.13½	.14	.13½	.14	.14	.17½
Dinitronaphthalene, 350 lb bbls	lb.	.35	.38	.35	.38	.35	.38
Dinitrophenol, 350 lb bbls	lb.	.23	.24	.23	.24	.23	.24
Dinitrotoluene, 300 lb bbls	lb.	...	.15½	...	.15½	.14½	.15½

k Higher price is for purified material.

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If you had to shiver in the snow and rain,
If you had to ride on a rickety train,

If you were jostled and jarred in a truck,
And slid in the mud and dumped in the muck,

If you were cracked—as I hope you're not—
And your contents spilled all over the lot,

If you had to sit in a cold, damp cellar,
Instead of being the buyer or seller,

If you were your product instead of the boss,
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A bag that is proof against water and moisture,
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Diphenyl
Glue, Casein

Prices

		Current Market		1938 Low	1938 High	1937 Low	1937 High
Diphenyl, bbls	lb.	.15	.25	.15	.25	.15	.25
Diphenylamine	lb.	.31	.32	.31	.32	.31	.32
Diphenylguanidine, 100 lb drs	lb.	.35	.37	.35	.37	.35	.37
Dip Oil, see Tar Acid Oil.							
Divi Divi pods, bgs shipmt	ton	...	nom.	...	nom.	34.00	nom.
Extract	lb.	.05	.05½	.05	.05½	.05	.05½
EGG YOLK							
Egg Yolk, dom., 200 lb cases	lb.	.68	nom.	...	.68	.68	nom.
Imported	lb.	.65	nom.	...	.65	.53	.65
Epsom Salt, tech, 300 lb bbls							
c-l, NY	100 lb.	1.90	2.10	1.90	2.10	1.80	2.10
USP, c-l, bbls	100 lb.	...	2.10	...	2.10	2.00	2.10
Ether, USP anaesthesia 55 lb drs	lb.	.22	.23	.22	.23	.22	.23
(Conc)	lb.	.09	.10	.09	.10	.09	.10
Isopropyl 50 gal drs	lb.	.07	.08	.07	.08	.07	.08
tks, frt allowed	lb.	...	.06	...	.06	...	.06
Nitrous, conc, bottles	lb.	...	.68	...	.68	.68	.77
Synthetic, wks, drs	lb.	.08	.09	.08	.09	.08	.09
Ethyl Acetate, 85% Ester							
tks, frt all'd	lb.	...	.05½	...	.05½	.05½	.06½
drs, frt all'd	lb.	...	.06½	...	.06½	.06½	.07½
95%, tks, frt allowed	lb.	...	.06¾	...	.06¾	...	.06¾
drs, frt all'd	lb.	...	.07¾	...	.07¾	...	.07¾
Acetoacetate, 110 gal drs	lb.	...	.27½	...	.27½	...	.27½
Benzylaniline, 300 lb drs	lb.	.86	.88	.86	.88	.86	.88
Bromide, tech, drs	lb.	.50	.55	.50	.55	.50	.55
Cellulose, drs, wks, frt all'd	lb.	.70	1.00	.70	1.00	...	...
Chloride, 200 lb drs	lb.	.22	.24	.22	.24	.22	.24
Chlorocarbonate, cbys	lb.	...	.30	...	.30	...	.30
Crotonate, drs	lb.	1.00	1.25	1.00	1.25	1.00	1.25
Formate, drs, frt all'd	lb.	.27	.28	.27	.28	.27	.31
Lactate, drs, wks	lb.	...	.33	...	.33	...	.33
Oxalate, drs, wks	lb.	.30	.34	.30	.34	.30	.34
Oxybutyrate, 50 gal drs, wks	lb.	.30	.30½	.30	.30½	.30	.30½
Silicate, drs, wks	lb.	...	.77	...	.77	...	.77
Ethylene Dibromide, 60 lb drs	lb.	.65	.70	.65	.70	.65	.70
Chlorhydrin, 40%, 10 gal cbys chloro, cont	lb.	.75	.85	.75	.85	.75	.85
Anhydrous	lb.	...	.75	...	.75	...	.75
Dichloride, 50 gal drs, wks	lb.	.0545	.0994	.0545	.0994	.0545	.0994
Glycol, 50 gal drs, wks	lb.	.17	.21	.17	.21	.17	.21
tks, wks	lb.	...	.16	...	.16	...	.16
Mono Butyl Ether, drs, wks	lb.	.20	.21	.20	.21	.20	.21
tks, wks	lb.	...	.19	...	.19	...	.19
Mono Ethyl Ether, drs, wks	lb.	.16	.17	.16	.17	.16	.17
tks, wks	lb.	...	.15	...	.15	...	.15
Mono Ethyl Ether Acetate, drs, wks	lb.	...	.14	...	.14	...	.14
tks, wks	lb.	...	.13	...	.13	...	.13
Mono, Methyl Ether, drs wks	lb.	.18	.22	.18	.22	.18	.22
tks, wks	lb.	...	.17	...	.17	...	.17
Oxide, cyl	lb.	.50	.55	.50	.55	.50	.55
Ethylidenaniline	lb.	.45	.47½	.45	.47½	.45	.47½
Feldspar, blk pottery	ton	17.00	19.00	17.00	19.00	...	14.50
Powd, blk, wks	ton	14.00	14.50	14.00	14.50	14.00	14.50
Ferric Chloride, tech, crys, 475 lb bbls	lb.	.05	.07½	.05	.07½	.05	.07½
sol, 42° cbys	lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
Fish Scrap, dried, unground, wks	unit *l*	no prices		...	...	...	...
Acid, Bulk, 6 & 3%, delv Norfolk & Baltimore basis	unit *m*	...	nom.	...	...	2.75	3.15
Fluorspar, 98%, bgs	lb.	...	33.00	...	33.00	no prices	
Formaldehyde, USP, 400 lb bbls, wks	lb.	.05¾	.06¼	.05¾	.06¼	.05¾	.06¼
Fossil Flour	lb.	.02½	.04	.02½	.04	.02¼	.04
Fullers Earth, blk, mines	ton	10.00	11.00	10.00	11.00	6.50	15.00
Imp powd, c-l, bgs	ton	23.00	30.00	23.00	30.00	23.00	30.00
Furfural (tech) drs, wks	lb.	.10	.15	.10	.15	.10	.15
Furfuramide (tech) 100 lb drs	lb.	...	.30	...	.30	...	.30
Fusel Oil, 10% impurities	lb.	.16	.18	.16	.18	.16	.18
Fustic, crystals, 100 lb boxes	lb.	.22	.26	.22	.26	.20	.26
Liquid 50°, 600 lb bbls	lb.	.09½	.13	.09½	.13	.08½	.13
Solid, 50 lb boxes	lb.	.17½	.19½	.17½	.19½	.16	.19½
G SALT PASTE							
G Salt paste, 360 lb bbls	lb.	.45	.47	.45	.47	.45	.47
Gall Extract	lb.	.19	.20	.19	.20	.19	.20
Gambier, com 200 lb bgs	lb.	...	nom.	...	nom.	...	nom.
Singapore cubes, 150 lb bgs	100 lb.	...	.10½	...	.10½	.09½	.10½
Gelatin, tech, 100 lb cs	lb.	.45	.50	.45	.50	.45	.55
Glauber's Salt, tech, c-l, bgs, wks*	100 lb.	.95	1.15	.95	1.15	.95	1.15
Anhydrous, see Sodium Sulfate.							
Glue, bone, com grades, c-l bgs	lb.	.13	.16½	.13	.16½	.11	.17½
Better grades, c-l, bgs	lb.	.14½	.16½	.14½	.16½	.12½	.17½
Casein, kgs	lb.	.18	.22	.18	.22	.18	.22

l + 10; *m* + 50; *Bbls. are 20c higher.

Current

Glycerin
Gum, Hemlock

		Current Market		1938 Low	1938 High	1937 Low	1937 High
Glycerin, CP, 550 lb drs	lb.	.15½	.16	.15½	.16	.15½	.29
Dynamite, 100 lb drs	lb.	.15½	.16	.15½	.16	.15½	.29
Saponification, drs	lb.	.10	.10½	.10	.11¼	.11	.29
Soap Lye, drs	lb.	.09	.09½	.09	.10¼	.10	.27
Glyceryl Bori-Borate, bbls	lb.	...	.40	...	.40	...	...
Monoricinoleate, bbls	lb.	...	.27	...	.27	...	...
Monostearate, bbls	lb.	...	.30	...	.30	...	...
Oleate, bbls	lb.	...	.22	...	.22	...	...
Phthalate	lb.	...	.37	...	.37	.29	.37
Glyceryl Stearate, bbls	lb.	...	.18	...	.18	...	.18
Glycol Bori-Borate, bbls	lb.	...	.26	...	.26	...	...
Phthalate, drs	lb.	...	.40	...	.40	.29	.40
Stearate, drs	lb.	...	.27½	...	.27½	.23	.27½
GUMS							
Gum Aloes, Barbadoes	lb.	.85	.90	.85	.90	.85	.90
Arabic, amber sorts	lb.	.11	.11¼	.11	.12	.10½	.15½
White sorts, No. 1, bgs	lb.	.24	.25	.24	.25	.24	.30
No. 2, bgs	lb.	.22	.23	.22	.23	.22	.28
Powd, bbls	lb.	.14	.15	.14	.16	.14	.19
Asphaltum, Barbadoes (Manjak) 200 lb bgs, f.o.b., NY	lb.	.02½	.10½	.02½	.10½	.02½	.10½
California, f.o.b., NY, drs	ton	29.00	55.00	29.00	55.00	29.00	55.00
Egyptian, 200 lb cases, f.o.b., NY	lb.	.12	.15	.12	.15	.12	.15
Benzoin Sumatra, USP, 120 lb cases	lb.	.18	.20	.15	.20	.15	.25
Copal, Congo, 112 lb bgs, clean, opaque	lb.	...	.19¼	...	.19¼	.18⅞	.19¼
Dark amber	lb.	...	.08⅞	...	.08⅞	.06⅞	.09¼
Light amber	lb.	...	.13¼	...	.13¼	.10¼	.14⅜
Copal, East India, 180 lb bgs							
Macassar pale bold	lb.	...	.13	...	.13	...	.13
Chips	lb.	...	.05⅜	...	.05⅜	.05⅜	.06½
Dust	lb.	.03⅝	.04⅛	.03⅝	.04⅛	.03⅝	.04⅛
Nubs	lb.	...	.10⅜	...	.10⅜	.10⅜	.11¼
Singapore, Bold	lb.	...	.15¼	...	.15¼	.15¼	.15⅝
Chips	lb.	...	.04¾	...	.04¾	.04¼	.05
Dust	lb.	.03⅝	.04⅛	.03⅝	.04⅛	.03⅝	.04⅛
Nubs	lb.	...	.10	...	.10	.10	.10¾
Copal Manilla, 180-190 lb baskets, Loba A	lb.	...	.12	...	.12	.09¾	.12
Loba B	lb.	...	.11⅝	...	.11⅝	.09¼	.11⅝
Loba C	lb.	...	.11¼	...	.11¼	.08⅞	.11¼
DBB	lb.	...	.08¾	...	.08¾	.08	.08¾
Dust	lb.	...	.06⅝	...	.06⅝	.05¾	.06⅝
MA sorts	lb.	...	.07¼	...	.07¼	.06¾	.07¼
Copal Pontianak, 224 lb cases, bold genuine	lb.	...	.16½	...	.16½	.15½	.16½
Chips	lb.	...	.10¼	...	.10¼	.09⅛	.11⅛
Mixed	lb.	...	.14	...	.14	.13½	.14
Nubs	lb.	...	.12⅞	...	.12⅞	.12¼	.13½
Split	lb.	...	.13⅞	...	.13⅞	.13½	.15¼
Dammar Batavia, 136 lb cases							
A	lb.	...	.25½	...	.25½	.23½	.25½
B	lb.	...	.24	...	.24	.22⅛	.24
C	lb.	...	.20⅜	...	.20⅜	.18½	.20⅜
D	lb.	...	.17½	...	.17½	.15¼	.17½
A/D	lb.	...	.20⅜	...	.20⅜	.17⅝	.20⅜
A/E	lb.	...	.17¼	...	.17¼	.14⅞	.17¼
E	lb.	...	.08½	...	.08½	.07½	.08½
F	lb.	...	.07¼	...	.07¼	.06¼	.07¼
Singapore, No. 1	lb.	...	.19⅝	.19⅝	.21⅛	.17⅛	.21½
No. 2	lb.	...	.15⅜	...	.15⅜	.14⅛	.16¼
No. 3	lb.	...	.05¾	...	.05¾	...	.05¾
Chips	lb.	...	.13½	...	.13½	.10¼	.13½
Dust	lb.	...	.05¾	...	.05¾	.05¼	.06
Seeds	lb.	...	.09½	...	.09½	.07⅛	.09½
Elemi, cons	lb.	.09⅜	.09½	.09⅜	.09½	.09⅜	.10¼
Ester	lb.	.08¼	.08½	.08¼	.08½	.09	.12
Gamboge, pipe, cases	lb.	.80	nom.	...	.80	.58	.80
Powd, bbls	lb.	...	.85	...	.85	.65	.85
Ghatti, sol. bgs	lb.	.11	.15	.11	.15	.11	.15
Karaya, powd, bbls, xxx	lb.	.27	.30	.27	.30	.24	.30
xx	lb.	.18	.19	.18	.19	.16	.19
No. 1	lb.	.12	.13	.12	.13	.09½	.13
No. 2	lb.	.11	.12	.11	.12	.08½	.12
Kauri, NY, San Francisco, Brown XXX, cases	lb.	.60	.60½	.60	.60½	.60	.60½
BX	lb.	...	.38	...	.38	.33	.38
B1	lb.	...	.28	...	.28	.21	.28
B2	lb.	...	.24	...	.24	.15½	.26
B3	lb.	...	.18½	...	.18½	.12	.18½
Pale XXX	lb.	...	.61	...	.61	.61	.65½
No. 1	lb.	...	.41	...	.41	.40	.41
No. 2	lb.	...	.24	...	.24	.22	.24
No. 3	lb.	...	.17¾	...	.17¾	.15	.17¾
Kino, tins	lb.	2.00	2.10	2.00	2.10	.70	2.10
Mastic	lb.	.55	.56	.55	.56	.55	.58
Sandarac, prime quality, 200 lb bgs & 300 lb cks	lb.	.25	.26	.25	.26	.25	.35
Senegal, picked bags	lb.	.23	.24	.23	.25	.20	.29
Sorts	lb.	.11	.11½	.11	.12	.09¾	.15
Thus, bbls	280 lbs.	13.50	14.00	13.50	14.00	12.00	14.00
Strained	280 lbs.	...	14.00	...	14.00	12.00	14.00
Tragacanth, No. 1, cases	lb.	2.75	3.00	2.75	3.00	2.40	3.25
No. 2	lb.	2.40	2.75	2.40	2.75	2.00	2.75
No. 3	lb.	2.35	2.70	2.35	2.70	1.95	2.70
No. 4	lb.	2.30	2.65	2.30	2.65	1.85	2.65
No. 5	lb.	2.25	2.50	2.25	2.50	1.65	2.50
Yacca, bgs	lb.	.03½	.04½	.03½	.04½	.03¼	.04½
Helium, cyl (200 cu. ft.)	cyl.	...	25.00	...	25.00	...	25.00
Hematine crystals, 400 lb bbls	lb.	.18	.34	.18	.34	.16	.34
Hemlock, 25%, 600 lb bbls, wks	lb.	.03	.03¼	.03	.03¼	.03	.03¼
tks	lb.	...	.02¾	...	.02¾	...	.02¾

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Prices

		Current Market	1938 Low	1938 High	1937 Low	1937 High
Hexalene, 50 gal drs, wks	lb.	...	.30	...	.30	...	.30
Hexane, normal 60-70° C. Group 3, tks	gal.	...	.10½	...	.10½	...	.10½
Hexamethylenetetramine, powd, drs	lb.	.35	.36	.35	.36	.35	.36
Hexyl Acetate, secondary, delv, drs	lb.	.13	.13½	.13	.13½	.13	.13½
tks	lb.	...	.12	...	.12	...	.12
Hoof Meal, f.o.b. Chicago unit		...	3.35	3.20	3.35	3.20	3.75
Hydrogen Peroxide, 100 vol, 140 lb cbys	lb.	.19½	.20	.19½	.20	.20	.21
Hydroxylamine Hydrochloride	lb.	...	3.15	...	3.15	...	3.15
Hypernic, 51°, 600 lb bbls	lb.	.16	.21	.16	.21	.15	.21
INDIGO							
Indigo, Bengal, bbls	lb.	...	2.40	...	2.40	...	2.40
Synthetic, liquid	lb.	.16½	.19	.16½	.19	.16½	.19
Iodine, Resublimed, kgs	lb.	1.50	1.60	1.50	1.60	1.50	1.60
Irish Moss, ord, bales	lb.	.10	.11	.10	.11	.11	.12
Bleached, prime, bales	lb.	.19	.20	.19	.20	.19	.21
Iron Acetate Liq. 17°, bbls	lb.	.03	.04	.03	.04	.03	.04
Chloride see Ferric Chloride.							
Nitrate, coml, bbls 100	lb.	2.32	3.11	2.32	3.11	2.32	3.25
Isobutyl Carbinol (128-132° C) drs, wks	lb.	.33	.34	.33	.34	.33	.34
tks, wks	lb.	...	.32	...	.32	...	.32
Isopropyl Acetate, tks, frt all'd	lb.	...	.05½	...	.05½	.05½	.06½
drs, frt all'd	lb.	.06½	.07	.06½	.07	.06½	.08
Ether, see Ether, isopropyl.							
Keiselguhr, dom bags, c-l, Pacific Coast	ton	22 00	85.00	22.00	85.00	22.00	85.00
LEAD ACETATE							
Lead Acetate, f.o.b. NY, bbls, White, broken	lb.	...	.11	...	.11	.11	.13½
cryst, bbls	lb.	...	.11	...	.11	.11	.13½
gran, bbls	lb.	...	.11¾	...	.11¾	.11¾	.14¼
powd, bbls	lb.	...	.11¾	...	.11¾	.11¾	.14¼
Arsenate, East, drs	lb.	.13	.13½	.13	.13½	.11	.13½
Linoleate, solid, bbls	lb.	...	.19	...	.19	.18	.19
Metal, c-l, NY 100	lb.	...	4.90	4.75	4.90	4.75	7.05
Nitrate, 500 lb bbls, wks	lb.	.11	.11½	.11	.11½	.09	.11½
Oleate, bbls	lb.	.18½	.20	.18½	.20	.15	.20
Red, dry, 95% Pb_3O_4, delv	lb.	...	.074	.07¼	.074	.07¼	.0945
97% Pb_3O_4, delv	lb.	...	.0765	.07½	.0765	.07½	.09¾
98% Pb_3O_4, delv	lb.	...	.0790	.07¾	.0790	.07¾	.10
Resinate, precip, bbls	lb.	...	.16½	...	.16½	.14	.16½
Stearate, bbls	lb.	.22	.23	.22	.23	.22	.23
Titanate, bbls, c-l, f.o.b. wks, frt all'd	lb.	.11	.11½	.11	.11½	.10	.12
White, 500 lb bbls, wks	lb.	...	.06¾	...	.06¾	.06¼	.09
Basic sulfate, 500 lb bbls, wks	lb.	...	.06¼	...	.06¼	.06¼	.08¾
Lime, chemical quicklime, f.o.b., wks, bulk	ton	7.00	8.00	7.00	8.00	6 00	8.00
Hydrated, f.o.b., wks	ton	8.50	12.00	8.50	12.00	8.00	12.00
Lime Salts, see Calcium Salts.							
Lime sulfur, dealers, tks	gal.	.08	.11½	.08	.11½	.	.11
drs	gal.	.11	.16	.11	.16	.13	.16
Linseed Meal, bgs	ton	...	45.00	41.50	45.00	35.00	42.50
Litharge, coml, delv, bbls	lb.	...	.064	.06¼	.064	.06¼	.08½
Lithopone, dom, ordinary, delv, bgs	lb.	.04⅜	.04⅝	.04⅜	.04⅝	.04¼	.04⅝
bbls	lb.	.04⅝	.04⅞	.04⅝	.04⅞	.04½	.04⅞
High strength, bgs	lb.	.05⅞	.06¼	.05⅞	.06¼	.05¾	.06¼
bbls	lb.	.06⅛	.06⅜	.06⅛	.06⅜	.06	.06⅜
Titanated, bgs	lb.	.05⅞	.06¼	.05⅞	.06⅛	.05¾	.06⅛
bbls	lb.	.06⅛	.06⅜	.06⅛	.06⅜	.06	.06⅜
Logwood, 51°, 600 lb bbls	lb.	.09½	.11½	.09½	.11½	.08½	.11½
Solid, 50 lb boxes	lb.	.15	.19	.15	.19	.15	.17½
Sticks	ton	24.00	25.00	24.00	25 00	24.00	25.00
MADDER							
Madder, Dutch	lb.	.22	.25	.22	.25	.22	.25
Magnesite, calc, 500 lb bbl	ton	60.00	65.00	60.00	65.00	60.00	65.00
Magnesium Carb, tech, 70 lb bgs, wks	lb.	.05¾	.06½	.05¾	.07	.06	.07
Chloride flake, 375 lb drs, c-l, wks	ton	39.00	42.00	39.00	42.00	39.00	42.00
Fluosilicate, crys, 400 lb bbls, wks	lb.	.10	.10½	.10	.10½	.10	.10½
Oxide, calc tech, heavy bbls, frt all'd	lb.	.25	.30	.25½	.30½	...	...
Light, bbls, above basis	lb.	.20	.25	.20	.25½	...	...
USP Heavy, bbls, above basis	lb.	.25	.30	.25	.30½	...	...
Palmitate, bbls	lb.	.33	nom.	...	.33	.33	nom.
Silicofluoride, bbls	lb.	.09½	.10½	.09½	.10½	.09½	.10½
Stearate, bbls	lb.	.21	.24	.21	.24	.21	.24
Manganese acetate, drs	lb.	...	.26½	...	.26½	.25½	.26½
Borate, 30%, 200 lb bbls	lb.	.15	.16	.15	.16	.15	.16
Chloride, 600 lb cks	lb.	.09	.12	.09	.12	.09	.12
Dioxide, tech (peroxide), paper bgs, c-l	ton	...	62.50	...	62.50	47.50	62.50
Hydrate, bbls	lb.	...	.32	...	.32	...	.32
Linoleate, liq, drs	lb.	.18	.19¼	.18	.19¼	.18	.19¼
solid, precip, bbls	lb.	...	.19	...	.19	.17½	.19
Resinate, fused, bbls	lb.	.08¼	.08½	.08¼	.08½	.08¼	.08½
precip, drs	lb.	...	.12	...	.12	...	.12
Sulfate, tech, anhyd, 90-95%, 550 lb drs	lb.	.07	.07½	.07	.07½	.07	.07½

	Current Market	1938 Low	1938 High	1937 Low	1937 High
Mangrove, 55%, 400 lb bbls lb.	...	.04	...	.04	...	.04
Bark, African ... ton	25.00	25.50	25.00	25.50	25.00	27.00
Mannitol, pure cryst, cs, wks lb.	...	1.45	...	1.45	1.45	1.48
Marble Flour, blk ... ton	12.00	13.00	12.00	13.00	12.00	13.00
Mercury chloride (Calomel) lb.	...	1.38	1.38	1.59	1.05	1.60
Mercury metal ... 76 lb. flasks	78.00	79.00	78.00	79.00	81.00	99.00
Meta-nitro-aniline ... lb.	.67	.69	.67	.69	.67	.69
Meta-nitro-paratoluidine 200 lb bbls ... lb.	1.45	1.55	1.45	1.55	1.45	1.55
Meta-phenylene diamine 300 lb bbls ... lb.	.80	.84	.80	.84	.80	.84
Meta-toluene-diamine, 300 lb bbls ... lb.	.65	.67	.65	.67	.65	.67
Methanol, denat, grd, drs, c-l, frt all'd ... gal.	...	.34	.34	.36	.36	.53
tks, frt all'd ... gal.	...	.28	.28	.30	.30	.48
Pure, drs, c-l, frt all'd gal.	...	.38	...	.38	...	.38
tks ... gal.	...	.33	...	.33	...	.33
95%, tks ... gal.	...	.31	...	.31	...	.31
97%, tks ... gal.	...	.32	...	.32	...	.32
Methyl Acetate, tech, tks, delv ... lb.	...	.06½	...	.06½	...	...
55 gal drs, delv ... lb.	.07½	.08	.07½	.08	...	...
C.P. 97-99%, tks, delv lb.	...	.07	...	.07	...	...
55 gal drs, delv ... lb.	.08	.08½	.08	.08½	...	...
Acetone, frt all'd, drs gal. *p*	.34½	.40½	.34½	.40½	.34½	.58½
tks, frt all'd, drs ... gal. *p*	.28½	.32½	.28½	.32½	.28½	.44½
Synthetic, frt all'd, east of Rocky M., drs ... gal. *p*	.42	.51	.42	.51	.42	.59½
tks, frt all'd ... gal.	.36	.39½	.36	.39½	.36	.49½
West of Rocky M., frt all'd, drs ... gal. *p*	...	.46	...	.46	.46	.58
tks, frt all'd ... gal. *p*	...	.39½	...	.39½	.39½	.51
Anthraquinone ... lb.	.65	.67	.65	.67	.65	.67
Butyl Ketone, tks ... lb.	...	.10½	...	.10½	...	.10½
Chloride, 90 lb cyl ... lb.	.32	.40	.32	.40	.32	.43
Ethyl Ketone, tks, frt all'd lb.	...	.05½	.05½	.06	...	.07½
50 gal drs, frt all'd c-l ... lb.	...	.06½	.06½	.07	...	...
Formate, drs, frt all'd ... lb.	.35	.36	.35	.36	.35	.39
Hexyl Ketone, pure, drs lb.	...	.60	...	.60	...	.60
Lactate, drs, frt all'd ... lb.	...	.30	...	.30	...	.30
Propyl carbinol, drs ... lb.	.60	.75	.60	.75	.60	.75
Mica, dry grd, bgs, wks ... lb.	...	35.00	...	35.00	...	35.00
Michler's Ketone, kgs ... lb.	...	2.50	...	2.50	...	2.50
Molasses, blacksrap, tks, f.o.b. NY ... gal.	...	.07	...	.07	.07	.07¼
Monoamylamine, c-l, drs, wks lb.	.52	1.00	.52	1.00	.52	1.00
Monobutylamine, lcl, drs, wks ... lb.	...	.65	...	.65	...	...
Monochlorobenzene, see Chlorobenzene, mono.						
Monoethanolamine, tks, wks lb.	...	.23	...	.23	.25	.30
Monomethylamine, drs, frt all'd, E. Mississippi, c-l ... lb.	...	.65	...	.65	...	.65
Monomethylparaminosulfate, 100 lb drs ... lb.	3.75	4.00	3.75	4.00	3.75	4.00
Myrobalans 25%, liq bbls ... lb.	...	.04¼	...	.04¼	...	.04¼
50% Solid, 50 lb boxes ... lb.	.06	.06¼	.06	.06¼	.06	.06¼
J1 bgs ... ton	...	28.00	28.00	30.00	26.50	30 00
J2 bgs ... ton	...	21.00	21.00	22.00	19.00	22.50
R2 bgs ... ton	...	22.00	...	22.00	18.75	22.00
NAPHTHA						
Naphtha, v.m.&p. (deodorized) see petroleum solvents.						
Naphtha, Solvent, water-white, tks ... gal.	...	.31	...	.31	...	.31
drs, c-l ... gal.	...	.36	...	.36	...	.36
NAPHTHALENE						
Naphthalene, dom, crude, bgs, wks ... lb.	2.35	2.70	2.35	2.70	2.00	3.00
Imported, cif, bgs ... lb.	2.20	2.25	2.20	2.25	2.20	3.00
Balls, flakes, pks ... lb.	...	.08	...	.08	...	.08
Balls, ref'd, bbls, wks ... lb.	...	.07¼	...	.07¼	...	.07¼
Flakes, ref'd, bbls, wks ... lb.	...	.07¼	...	.07¼	...	.07¼
Nickel Carbonate, bbls ... lb.	.36	.37½	.36	.37½	.36	.37½
Chloride, bbls ... lb.	.18	.20	.18	.20	.18	.20
Metal ingot ... lb.	...	.35	...	.35	...	.35
Oxide, 100 lb kgs, NY ... lb.	.35	.37	.35	.37	.35	.37
Salt, 400 lb bbls, NY ... lb.	.13	.13½	.13	.13½	.13	.13½
Single, 400 lb bbls, NY lb.	.13	.13½	.13	.13½	.13	.13½
Nicotine, 40%, drs, sulfate, 55 lb drs ... lb.	...	.76	...	.76	...	.76
Nitre Cake, blk ... ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, redistilled, 1000 lb drs, wks ... lb.	.08	.10	.08	.10	.08	.10
tks ... lb.	...	.07½	...	.07½	...	.07½
Nitrocellulose, c-l, l-c-l, wks lb.	.22	.29	.22	.29	.26	.29
Nitrogenous Mat'l, bgs, imp unit	...	2.65	2.55	2.65	2.55	3.55
dom, Eastern wks ... unit	2.65	2.75	2.50	2.75	2.50	4.25
dom, Western wks ... unit	2.20	2.25	2.20	2.25	2.25	3.75
Nitronaphthalene, 550 lb bbls lb.	.24	.25	.24	.25	.24	.25
Nutgalls Alleppo, bgs ... lb.	no prices		...	...	.20	.22
Chinese, bgs ... lb.	no prices		...	...	.20	.22
OAK BARK						
Oak Bark Extract, 25%, bbls lb.	...	.03⅛	...	.03⅛	...	.03⅛
tks ... lb.	...	.02¾	...	.02¾	...	.02¾
Octyl Acetate, tks, wks ... lb.	.16	.17	.16	.17	.16	.17

a Country is divided in 4 zones, prices varying by zone; *p* Country is divided into 4 zones. Also see footnote directly above; *q* Naphthalene quoted on Pacific Coast F.A.S. Phila. or N. Y.

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Orange-Mineral Phenylhydrazine Hydrochloride — Prices

	Current Market	1938 Low	1938 High	1937 Low	1937 High
Orange-Mineral, 1100 lb cks NY lb.	.10¼		.10¼	.10¼	.12¾
Orthoaminophenol, 50 lb kgs lb.	2.15	2.15	2.25	2.15	2.25
Orthoanisidine, 100 lb drs lb.	.70	.70	.74	.70	.74
Orthochlorophenol, drs lb.	.35	.35	.75	.35	.75
Orthocresol, drs, wks lb.	.13½	.13½	.14½	.13½	.14½
Orthodichlorobenzene, 1000 lb drs lb.	.06	.06	.07	.05	.07
Orthonitrochlorobenzene, 1200 lb drs, wks lb.	.15	15	.18	.28	.29
Orthonitroparachlorphenol, tins lb.	...	...	.75	.70	.75
Orthonitrophenol, 350 lb drs lb.	.85	.85	.90	.85	.90
Orthonitrotoluene, 1000 lb drs, wks lb.	.08	.08	.10	.07	.10
Orthotoluidine, 350 lb bbls, l-c-l lb.	.16	.16	.17	.14	.17
Osage Orange, cryst, bbls lb.	.17	.17	.25	.17	.25
51° liquid lb.	.07	.07	.08	.07	.08
Paraffin, rfd, 200 lb cs slabs 122-127° M P lb.	.0445	.0445	.04½	.0445	.04½
128 132° M P lb.	.04¾	.049	.04¾	.049	.04¾
133-137° M P lb.	.05½	.05½	.05¾	.05½	.05¾
Para aldehyde, 110-55 gal drs lb.	.16	.16	.18	.16	.18
Aminoacetanilid, 100 lb kgs lb	...	...	.85	...	.85
Aminohydrochloride, 100 lb kgs lb.	1.25	1.25	1.30	1.25	1.30
Aminophenol, 100 lb kgs lb.			1.05		1.05
Chlorophenol, drs lb.	.30	.30	.45	.30	.45
Dichlorobenzene, 200 lb drs, wks lb.	.11	.11	.12	.11	.20
Formaldehyde, drs, wks lb.	.34	.34	.35	.34	.35
Nitroacetanilid, 300 lb bbls lb.	.45	.45	.52	.45	.52
Nitroaniline, 300 lb bbls, wks lb.	.45	.45	.47	.45	.47
Nitrochlorobenzene, 1200 lb drs, wks lb.	.15	.15	.16	.23½	.24
Nitro-orthotoluidine, 300 lb bbls lb.	2.75	2.85	2.75	2.85	2.75	2.85
Nitrophenol, 185 lb bbls lb.	.35	.35	.37	.35	.37
Nitrosodimethylaniline, 120 lb bbls lb.	.92	.92	.94	.92	.94
Nitrotoluene, 350 lb bbls lb.	...	...	.35	...	.35
Para Tertiary amyl phenol, wks, drs, c-l lb.	...	...	.26	...	.26
Phenylenediamine, 350 lb bbls lb.	1.25	1.25	1.30	1.25	1.30
Toluenesulfonamide, 175 lb bbls lb.	.70	.70	.75	.70	.75
tks, wks lb.	...	...	.31	...	.31
Toluenesulfonchloride, 410 lb bbls, wks lb.	.20	.20	.22	.20	.22
Toluidine, 350 lb bbls, wks lb.	.56	.56	.58	.56	.58
Paris Green, dealers, drs lb.	.25½	.25½	.26½	.22	.26½
Pentane, normal, 28-38° C, group 3, tks gal.		.08½		.08½	.08½	.09½
drs, group 3 gal.	.12½	.12½	.16	.12½	.16
Perchlorethylene, 100 lb drs, frt all'd lb.	...	...	.10½	...	.10½
Petrolatum, dark amber, bbls lb.	.02¾	.02¾	.03⅞	.02⅝	.03
Light, bbls lb.	.03⅛	.03⅛	.03⅜	.03⅛	.03⅜
Medium, bbls lb.	.02⅞	.02⅞	.03⅛	.02⅞	.03⅛
Dark green, bbls lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
Red, bbls lb.	.02½	.02½	.03⅝	.02⅛	.03¾
White, lily, bbls lb.	.05½	.05½	.07⅛	.06	.06¼
White, snow, bbls lb.	.06½	.06½	.08⅛	.07	.07¼
Petroleum Ether, 30-60°, group 3, tks gal.	...	...	.13	...	.13
drs, group 3 gal.	.14	.14	.17	.15	.17

PETROLEUM SOLVENTS AND DILUENTS

Cleaners naphthas, group 3, tks, wks gal.	...	.07⅜	...	.07⅜	.06⅞	.07⅞
Bayonne, tks, wks gal.	...	.10	...	.10	.09½	10
Hydrogenated, naphthas, frt all'd East, tks gal.	...	.16	...	.16	...	.16
No. 2, tks gal.	...	.18	...	.18	...	.18
No. 3, tks gal.	...	.16	...	.16	...	.16
No. 4, tks gal.	...	.18	...	.18	...	.18
Lacquer diluents, tks, Bayonne gal.	.12	.12½	.12	.12½	.12	.12½
Group 3, tks gal.	...	.08⅜	...	.08⅜	.07⅜	.08⅞
Naphtha, V.M.P., East, tks, wks gal.	...	.10	.10	.11	.10	.11
Group 3, tks, wks gal.	...	.07⅜	...	.07⅜	.06⅞	.07⅞
Petroleum thinner, East, tks, wks gal.	...	.09½	...	.09½	.09	.10
Group 3, tks, wks gal.	...	.06⅜	...	.06⅜	.05⅞	.06⅞
Rubber Solvents, stand grd, East, tks, wks gal.	.09½	.10	.09½	.10	.09½	.10
Group 3, tks, wks gal.	...	.07⅜	...	.07⅜	.06⅞	.07⅞
Stoddard Solvent, East, tks, wks gal.	...	.10	...	.10	.09½	.10
Group 3, tks, wks gal.	...	.06⅞	...	.06⅞	.06⅜	.07⅜
Phenol, 250-100 lb drs lb.	.14½	.15½	.14½	.15½	.13¼	.15½
tks, wks lb.	...	.13½	...	.13½	.12¾	.13½
Phenyl-Alpha-Naphthylamine, 100 lb kgs lb.	...	1.35	...	1.35	...	1.35
Phenyl Chloride, drs lb.	...	.17	...	.17	.16	.17
Phenylhydrazine Hydrochloride, com lb.	..	1.50	...	1.50	...	1.50

		Current Market	1938 Low	1938 High	1937 Low	1937 High
Phloroglucinol, tech, tins	lb.	15.00 16.50	15.00	16.50	15.00	16.50
CP, tins	lb.	20.00 22.00	20.00	22.00	20.00	22.00
Phosphate Rock, f.o.b. mines						
Florida Pebble, 68% basis	ton	... 1.85	...	1.85	...	1.85
70% basis	ton	... 2.35	...	2.35	...	2.35
72% basis	ton	... 2.85	...	2.85	...	2.85
75-74% basis	ton	... 3.85	...	3.85	...	3.85
75% basis	ton	... 5.50	...	5.50	...	5.50
Tennessee, 72% basis	ton	... 4.50	...	4.50	...	4.50
Phosphorus Oxychloride 175 lb cyl	lb.	.16 .20	.16	.20	.16	.20
Red, 110 lb cases	lb.	.40 .44	.40	.44	.40	.44
Sesquisulfide, 100 lb cs	lb.	.38 .44	.38	.44	.38	.44
Trichloride, cyl	lb.	.15 .18	.15	.18	.15	.20
Yellow, 110 lb cs, wks	lb.	.24 .30	.24	.30	.24	.33
Phthalic Anhydride, 100 lb drs, wks	lb.	... .14½	...	.14½	.14½	.15½
Pine Oil, 55 gal drs or bbls						
Destructive dist	lb.	.52 .55	.52	.55	.49	.65
Steam dist wat wh bbls	gal.	... .59	...	.59	.59	.79
tks	gal.	.54		.54	.54	.74
Pitch Hardwood, wks	ton	18.25 18.75	18.25	18.75	15.00	18.75
Coaltar, bbls, wks	ton	19.00		19.00		19.00
Burgundy, dom, bbls, wks	lb.	.05½ .06½	.05½	.06½	.03½	.06½
Imported	lb.	.15 .16	.15	.16	.11	.16
Petroleum, see Asphaltum in Gums' Section.						
Pine, bbls	bbl.	6.00 6.25	5.75	6.25	5.75	6.50
Stearin, drs	lb.	.03 .04½	.03	.04½	.03	.04½
Platinum, ref'd	oz	32.00 38.00	32.00	38.00	32.00	68.00

POTASH

Potash, Caustic, wks, sol	lb.	.06¼ .06½	.06¼	.06½	.06¼	.06½
flake	lb.	.07 .07⅜	.07	.07⅜	.07	.07⅜
Liquid, tks	lb.	... .02⅞	...	.02⅞	...	.02⅞
Manure Salts, imported 30% basis, blk	unit	... .58½	...	.58½	.55	.58½
Potassium Abietate, bbls	lb.	.13		.13		
Acetate	lb.	.26 .28	.26	.28	.26	.28
Bicarbonate, USP, 320 lb bbls	lb.	... .18	...	.18	.09	.18
Bichromate Crystals, 725 lb cks*	lb.	.08¾ .09¼	.08¾	.09¼	.08¼	.09
Binoxalate, 300 lb bbls	lb.	... .23	...	.23	...	.23
Bisulfate, 100 lb kgs	lb.	.15½ .18	.15½	.18	.15½	.18
Carbonate, 80-85% calc 800 lb cks	lb.	.06½ .07	.06½	.07	.06½	.07
liquid, tks	lb.	... .02⅞	...	.02⅞	.02¼	.02⅞
drs, wks	lb.	.03 .03½	.03	.03½	.02⅞	.03½
Chlorate crys, 112 lb kgs, wks	lb.	.09¼ .09½	.09¼	.09½	.09¼	.09½
gran, kgs	lb.	.12 .13	.12	.13	.12	.13
powd, kgs	lb.	.08½ .08¾	.08½	.08¾	.08½	.08¾
Chloride, crys, bbls	lb.	.04 .04¾	.04	.04¾	.04	.04¾
Chromate, kgs	lb.	.19 .28	.19	.28	.28	.29
Cyanide, 110 lb cases	lb.	.55 .57½	.55	.57½	.55	.57½
Iodide, 75 lb bbls	lb.	.93 1.00	.93	1.00	.93	1.15
Metabisulfite, 300 lb bbls	lb.	.13 .15	.13	.15	.11	.15
Muriate, bgs, dom, blk	unit	.53½		.53½	.50	.53½
Oxalate, bbls	lb.	.25 .26	.25	.26	.25	.26
Perchlorate, kgs, wks	lb.	.09½ .11½	.09½	.11½	.09½	.11
Permanganate, USP, crys, 500 & 1000 lb drs, wks	lb.	.18½ .19½	.18½	.19½	.18½	.19½
Prussiate, red, bbls	lb.	.35 .37	.35	.37	.35	.37
Yellow, bbls	lb.	.15 .16	.15	.16	.15	.18
Sulfate, 90% basis, bgs	ton	... 38.00	...	38.00	...	36.25
Titanium Oxalate, 200 lb bbls	lb.	.35 .40	.35	.40	.33	.40
Pot & Mag Sulfate, 48% basis bgs	ton	... 25.75	...	25.75	24.75	25.75
Propane, group 3, tks	lb.	.03 .04⅜	.03	.04⅜	.03	.04⅜
Putty, coml, tubs	100 lb.	... 2.90	...	2.90	2.90	3.00
Linseed Oil, kgs	100 lb.	... 4.65	...	4.65	4.65	4.75
Pyrethrum, conc liq:						
2.4% pyrethrins, drs, frt all'd	gal.	5.10 5.40	5.00	5.45	4.15	5.25
3.6% pyrethrins, drs, frt all'd	gal.	7.65 8.00	7.65	8.00	6.10	7.85
Flowers, coarse, Japan, bgs	lb.	... .19	.18	.19	.12¾	.18
Fine powd, bbls	lb.	... .22	.19	.22	.14	.19
Pyridine, denat, 50 gal drs	gal.	... 1.55	...	1.55	1.30	1.55
Refined, drs	lb.	... .45	...	.45	...	...
Pyrites, Spanish cif Atlantic ports, blk	unit	.12 .13	.12	.13	.12	.13
Pyrocatechin, CP, drs, tins	lb.	2.15 2.75	2.15	2.75	2.15	2.75
Quebracho, 35% liq tks	lb.	... .03	...	.03	.02⅞	.03
450 lb bbls, c-l	lb.	... .03½	...	.03½	.03½	.03⅞
Solid, 63%, 100 lb bales cif	lb	... .04	...	.04	.03⅞	.04
Clarified 64%, bales	lb.	... .04¼	...	.04¼	.04¼	.04⅜
Quercitron, 51 deg liq, 450 lb bbls	lb.	.06 .06½	.06	.06½	.06	.06½
Solid, drs	lb.	.10 .12	.10	.12	.10	.12

R SALT

R Salt, 250 lb bbls, wks	lb.	.52	.55	.52	.55	.52	.55
Resorcinol tech, cans	lb.	.75	.80	.75	.80	.75	.80
Rochelle Salt, cryst	lb.	.15	.15½	.15	.15½	.14½	.15½
Powd, bbls	lb.	.16	.16½	.16	.16½	.13½	.16½
Rosin Oil, bbls, first run	gal.	.54	.56	.52	.56	.52	.73
Second run	gal.	.56	.58	.54	.58	.54	.75
Third run, drs	gal.	.60	.62	.58	.62	.58	.79

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Rosins
Sodium Naphthionate

Prices

	Current Market	1938 Low	1938 High	1937 Low	1937 High
Rosins 600 lb bbls, 280 lb unit ex. yard NY:†					
B	... 6.00	5.50	6.00	5.50	10.00
D	... 6.00	5.50	6.00	5.50	10.35
E	... 6.00	5.75	6.00	5.75	10.25
F	... 7.00	6.87½	7.00	6.87½	10.80
G	... 7.05	6.87½	7.05	6.87½	10.85
H	... 7.15	7.07½	7.15	6.90	10.85
I	... 7.15	7.07½	7.15	6.95	10.90
K	... 7.15	7.15	7.25	6.95	10.90
M	... 7.30	7.30	7.40	7.05	11.00
N	... 7.40	7.40	7.50	7.10	11.05
WG	... 8.45	8.20	8.45	7.65	11.75
WW	... 9.15	8.65	9.15	8.00	13.75
Rosins, Gum, Savannah (280 lb unit):†					
B	... 4.60	4.25	4.60	4.25	8.75
D	... 4.60	4.25	4.60	4.25	9.00
E	... 4.60	4.25	4.60	4.25	9.10
F	... 5.60	5.50	5.60	5.50	9.55
G	... 5.65	5.60	5.65	5.60	9.60
H	... 5.75	...	5.75	5.70	9.60
I	... 5.75	5.75	5.85	5.70	9.65
K	... 5.75	5.75	6.00	5.70	9.65
M	... 5.90	5.90	6.15	5.80	9.75
N	... 6.00	6.00	6.20	5.85	9.75
WG	... 7.05	7.00	7.05	6.40	10.50
WW	... 7.75	7.40	7.75	6.75	12.50
X	... 7.75	7.40	7.75	6.75	12.50
Rosin, Wood, c-l, FF grade, NY	... 6.30	6.30	6.40	6.40	10.72
Rotten Stone, bgs mines . . ton	... 35.00	...	35.00	...	35.00
Imported, lump, bbls . . . lb.	... .12	...	.12	...	...
Powdered, bbls . . . . . lb.	.08½ .10	.08½	.10	...	...

SAGO FLOUR

Sago Flour, 150 lb bgs . . . lb.	.02¾	.03½	.02¾	.03¾	.02¾	.03¾
Sal Soda, bbls, wks . . . 100 lb.	...	1.20	...	1.20	1.15	1.20
Salt Cake, 94-96%, c-l, wks ton	19.00	23.00	19.00	23.00	19.00	23.00
Chrome, c-l, wks . . . ton	11.00	12.00	11.00	12.00	11.00	12.00
Saltpetre, gran, 450-500 lb bbls . . . . . lb.	.06½	.069	.06½	.069	.06	.069
Cryst, bbls . . . . . lb.	.07½	.0865	.07½	.0865	.07	.0865
Powd, bbls . . . . . lb.	.07½	.079	.07½	.079	.07	.079
Satin, White, pulp, 550 lb bbls . . . . . lb.	.01¼	.01½	.01¼	.01½	.01¼	.01½
Schaeffer's Salt, kgs . . . . . lb.	.46	.48	.46	.48	.46	.48
Shellac, Bone dry, bbls . lb. *r*	.17	.17½	.17	.17½	.17	.22
Garnet, bgs . . . . . lb.	.14	.15	.14	.15	.14	.17
Superfine, bgs . . . . . lb. *s*	.13	.13½	.13	.13½	.13	.18½
T. N., bgs . . . . . lb. *s*	.12	.12½	.12	.12½	.12	.14½
Silver Nitrate, vials . . . . . oz.	.32⅝	.34⅛	.32⅝	.34⅛	.32⅝	.35½
Slate Flour, bgs, wks . . . . ton	9.00	10.00	9.00	10.00	9.00	10.00
Soda Ash, 58% dense, bgs, c-l, wks . . . . . 100 lb.	...	1.10	...	1.10	...	1.10
58% light, bgs . . . . . 100 lb.	...	1.08	...	1.08	...	1.08
blk . . . . . 100 lb.	...	.90	...	.90	...	.90
paper bgs . . . . . 100 lb.	...	1.05	...	1.05	...	1.05
bbls . . . . . 100 lb.	...	1.35	...	1.35	...	1.35
Caustic, 76% grnd & flake, drs . . . . . 100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drs . . . . . 100 lb.	...	2.30	...	2.30	...	2.30
Liquid sellers, tks . . 100 lb.	...	1.97½	...	1.97½	...	1.97½
Sodium Abietate, drs . . . . lb.	...	.13	...	.13	.08	.13
Acetate, tech, 450 lb bbls, wks . . . . . lb.	.04¼	.05	.04¼	.05	.04¼	.05
anhyd, drs . . . . . lb.	...	.08¼	...	.08¼	...	...
Alignate, drs . . . . . lb.	...	.69	...	.69	.64	.69
Antimoniate, bbls . . . . . lb.	.13¼	.13¾	.13¼	.15¼	.13¾	.16¼
Arsenate, drs . . . . . lb.	.08	.08½	.08	.08½	.08	.11½
Arsenite, liq, drs . . . . . gal.	.30	.33	.30	.33	.33	.40
Dry, gray, drs, wks . . lb.	.07½	.09½	.07½	.09½	...	...
Benzoate, USP, kgs . . . lb.	.46	.48	.46	.48	.46	.48
Bicarb, powd, 400 lb bbl, wks . . . . . 100 lb.	...	1.85	...	1.85	1.75	1.85
Bichromate, 500 lb cks, wks* . . . . . lb.	.06¾	.07¼	.06¾	.07¼	.06½	.07¼
Bisulfite, 500 lb bbl, wks lb.	.03¼	.036	.03¼	.036	.03¼	.036
35-40% sol bbls, wks 100 lb.	1.40	1.80	1.40	1.80	...	...
Chlorate, bgs, wks . . . . lb.	.06¼	.07½	.06¼	.07½	.06¼	.07½
Cyanide, 96-98%, 100 & 250 lb drs, wks . . . . . lb.	.16½	.17½	.16½	.17½	.15½	.17½
Fluoride, white 90%, 300 lb bbls, wks . . . . . lb.	.07½	.08¼	.07½	.08¼	.07½	.08¼
Hydrosulfite, 200 lb bbls, f.o.b. wks . . . . . lb.	.16	.17	.16	.17	.16	.17
Hyposulfite, tech, pea crys 375 lb bbls, wks 100 lb.	...	2.80	2.50	2.80	2.50	3.00
Tech, reg cryst, 375 lb bbls, wks . . . . . 100 lb.	2.45	2.80	2.40	2.80	2.40	2.75
Iodide . . . . . lb.	1.90	1.95	1.90	1.95	1.90	1.95
Metal, drs, 280 lbs. . . . . lb.	...	.19	...	.19	...	.19
Metanilate, 150 lb bbls lb.	.41	.42	.41	.42	.41	.42
Metasilicate, gran, c-l, wks . . . . . 100 lb.	...	2.20	2.15	2.20	...	2.15
cryst, bbls, c-l, wks 100 lb.	...	2.90	2.75	2.90	...	2.75
Monohydrate, bbls . . . . . lb.	...	.023	...	.023	...	.023
Naphthenate, drs . . . . . lb.	.12	.19	.12	.19	.09	.19
Naphthionate, 300 lb bbl lb.	.52	.54	.52	.54	.52	.54

r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; Philadelphia deliveries f.o.b. N. Y.; refined 6c higher in each case; *s* T. N. and Superfine prices quoted f.o.b. N. Y. and Boston; Chicago prices 1c higher; Pacific Coast 3c; Philadelphia f.o.b. N. Y. * Spot price is ⅛c higher; † Closing prices Nov. 26th.

		Current Market	1938 Low	1938 High	1937 Low	1937 High
Sodium (continued):						
Nitrate, 92%, crude, 200 lb bgs, c-l, NY	ton	... 28.30	...	28.30	26.80	28.30
100 lb bgs	ton	... 29.00	...	29.00	27.50	29.00
Bulk	ton	... 27.00	...	27.00	25.50	27.00
Nitrite, 500 lb bbls	lb.	.06¾ .11½	.06¾	.11½	.07	.10
Orthochlorotoluene, sulfonate, 175 lb bbls, wks	lb.	.25 .27	.25	.27	.25	.27
Perborate, drs, 400 lbs	lb.	.14¾ .15¼	.14¾	.15¼	.14¾	.15¼
Peroxide, bbls, 400 lb	lb.	... .17	...	.17	...	.17
Phosphate, di-sodium, tech, 310 lb bbls, wks	100 lb.	... 2.05	...	2.05	1.90	2.05
bgs, wks	100 lb.	... 1.85	...	1.85	1.70	1.85
Tri-sodium, tech, 325 lb bbls, wks	100 lb.	... 2.20	...	2.20	2.05	2.20
bgs, wks	100 lb.	... 2.00	...	2.00	1.85	2.00
Picramate, 160 lb kgs	lb.	.65 .67	.65	.67	.65	.67
Prussiate, Yellow, 350 lb bbl. wks	lb.	.10 .11½	.10	.11½	.10	.11½
Pyrophosphate, anhyd, 100 lb bbls	lb.	... .10	...	.10	...	.10
Sesquisilicate, drs, c-l, wks	100 lb.	... 3.00	...	3.00	...	...
Silicate, 60°, 55 gal drs, wks	100 lb.	1.65 1.70	1.65	1.70	1.65	1.70
40°, 35 gal drs, wks	100 lb.	... .80	...	.80	...	.80
tks, wks	100 lb.	... .65	...	.65	...	.65
Silicofluoride, 450 lb bbls NY	lb.	.05¾ .06	.05¾	.06½	.05¾	.07
Stannate, 100 lb drs	lb.	.27½ .30½	.27½	.31	.28	.44
Stearate, bbls	lb.	... .24	...	.24	.19	.24
Sulfanilate, 400 lb bbls	lb.	.16 .18	.16	.18	.16	.18
Sulfate Anhyd, 550 lb bgs* c-l, wks	100 lb. †	1.45 1.90	1.45	1.90	1.45	1.90
Sulfide, 80% cryst, 440 lb bbls, wks	lb.	... .02¼	...	.02¼	...	.02¼
Solid, 650 lb drs, c-l, wks	lb.	... .03	...	.03	...	.02
Sulfite, cryst, 400 lb bbls, wks	lb.	.023 .02½	.023	.02½	.023	.02½
Sulfocyanide, drs	lb.	.28 .47	.28	.47	.28	.47
Sulforicinoleate, bbls	lb.	... .12	...	.12	...	.12
Tungstate, tech, crys, kgs	lb.	... nom.	...	...	.85	.90
Sorbitol, com, solut., wks, c-l drs, wks	lb.	... .19	...	.19	...	.25
Spruce Extract, ord, tks	lb.	... .01⅛	...	.01⅛	.01	.01⅛
Ordinary, bbls	lb.	... .01⅝	...	.01⅝	.01½	.01⅝
Super spruce ext, tks	lb.	... .01⅜	...	.01⅜	.01⅜	.01⅝
Super spruce ext, bbls	lb.	... .01⅞	...	.01⅞	...	.01⅞
Super spruce ext, powd, bgs	lb.	... .04	...	.04	.04	.04¼
Starch, Pearl, 140 lb bgs	100 lb.	2.98 3.18	2.93	3.18	2.93	4.53
Powd, 140 lb bgs	100 lb.	3.08 3.28	3.03	3.28	3.03	4.63
Potato, 200 lb bgs	lb.	.03½ .05	.03½	.05½	.04½	.05½
Imp, bgs	lb.	.05 .06	.05	.06	.05	.06
Rice, 200 lb bbls	lb.	.07¼		.07¼		.07¼
Wheat, thick, bgs	lb.	.06¾ nom.	.06¾	.07	.07	.08½
Strontium carbonate, 600 lb bbls, wks	lb.	.07¼ .07½	.07¼	.07½	.07¼	.07½
Nitrate, 600 lb bbls, NY	lb.	.08¼ .09¼	.07¾	.09¼	.07¾	.08¾
Sucrose octa-acetate, den, grd, bbls, wks	lb.	... .45	...	.45	...	.45
tech, bbls, wks	lb.	... .40	...	.40	...	.40
Sulfur, crude, f.o.b. mines	ton	18.00 19.00	18.00	19.00	18.00	19.00
Flour, coml, bgs	100 lb.	1.65 2.35	1.65	2.35	1.65	2.35
bbls	100 lb.	1.95 2.70	1.95	2.70	1.95	2.70
Rubbermakers, bgs	100 lb.	2.20 2.80	2.20	2.80	2.20	2.80
bbls	100 lb.	2.55 3.15	2.55	3.15	2.55	3.15
Extra fine, bgs	100 lb.	2.85 3.00	2.85	3.00	2.85	3.00
Superfine, bgs	100 lb.	2.65 2.80	2.65	2.80	2.65	2.80
bbls	100 lb.	2.25 3.10	2.25	3.10	2.25	3.10
Flowers, bgs	100 lb.	3.00 3.75	3.00	3.75	3.00	3.75
bbls	100 lb.	3.35 4.10	3.35	4.10	3.35	4.10
Roll, bgs	100 lb.	2.35 3.10	2.35	3.10	2.35	3.10
bbls	100 lb.	2.50 3.25	2.50	3.25	2.50	3.25
Sulfur Chloride, 700 lb drs, wks	lb.	.03 .04	.03	.04	.02½	.04
Sulfur Dioxide, 150 lb cyl	lb.	.07 .09	.07	.09	.07	.09
Multiple units, wks	lb.	.04½ .07	.04½	.07	.04½	.07
tks, wks	lb.	.04 .05	.04	.05	.04	.05
Refrigeration, cyl, wks	lb.	.16 .17	.16	.17	.15	.17
Multiple units, wks	lb.	.07½ .10	.07½	.10	.07½	.10
Sulfuryl Chloride	lb.	.15 .40	.15	.40	.15	.40
Sumac, Italian, grd	ton	... 65.00	62.00	65.00	58.50	65.00
Extract, 42°, bbls	lb.	.05¼ .06¼	.05¼	.06¼	.05¼	.06¼
Superphosphate, 16% bulk, wks	ton	... 9.00	...	9.00	8.25	9.00
Run of pile	ton	... 8.50	...	8.50	8.00	8.50
Triple, 44-45%, a. p. a. bulk, wks, Balt. unit	ton	... .85	...	.85	.70	.85
Talc, Crude, 100 lb bgs, NY	ton	13.00 15.00	13.00	15.00	13.00	15.00
Ref'd, 100 lb bgs, NY	ton	14.00 16.00	14.00	16.00	14.00	16.00
French, 220 lb bgs, NY	ton	23.00 30.00	23.00	30.00	23.00	30.00
Ref'd, white, bgs, NY	ton	45.00 60.00	45.00	60.00	45.00	60.00
Italian, 220 lb bgs to arr	ton	60.00 62.00	60.00	62.00	60.00	62.00
Ref'd, white, bgs, NY	ton	65.00 70.00	65.00	70.00	65.00	70.00
Tankage Grd, NY	unit ‡	... 3.00	...	3.00	3.00	4.40
Ungrd	unit ‡	... 2.90	2.80	2.90	2.80	4.35
Fert grade, f.o.b. Chgo	unit ‡	... 2.75	...	2.75	2.75	4.00
South American cif	unit ‡	... 3.45	3.25	3.45	3.15	4.25
Tapioca Flour, high grade, bgs	lb.	.03¼ .05½	.03¼	.05½	.03¼	.05½
Tar Acid Oil, 15%, drs	gal.	.22½ .25½	.22½	.25½	.21	.25½
25%, drs	gal.	.26½ .29½	.26½	.29½	.24½	.29½
Tar, pine, delv, drs	gal.	... .26	...	.26	...	.26
tks, delv, E. cities	gal.	... .20	...	.20	...	.20
Tartar Emetic, tech, bbls	lb.	.26¾ .27	.26¾	.27	.24¾	.27
USP, bbls	lb.	.32 .32½	.32	.32½	.30	.32½

† Bags 15c lower; ‡ + 10; *Bbls. are 20c higher.

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Prices

		Current Market	1938 Low	1938 High	1937 Low	1937 High
Terpineol, den grade, drs	lb.	...	.17	.17	.13¾	.14¾
Tetrachlorethane, 650 lb drs	lb.	.08	.08½	.08	.08½	.08	.08½
Tetrachloroethylene, drs, tech	lb.	...	.09½	.09½	...	.10½
Tetralene, 50 gal drs, wks	lb.	.12	.13	.12	.13	.12	.13
Thiocarbanilid, 170 lb bbls	lb.	.20	.25	.20	.25	.20	.25
Tin, crystals, 500 lb bbls, wks	lb	.33	.33½	.33	.33½	.33	.46
Metal, NY	lb.	...	.40⅜	.40⅜	.41	.41	.66
Oxide, 300 lb bbls, wks	lb.	.48	.50	.48	.50	.48	.62
Tetrachloride, 100 lb drs, wks	lb.	...	.20¾	.20¾	.21	.21	.32
Titanium Dioxide, 300 lb bbls	lb.	.16¼	.17	.16¼	.17	.16¼	.17
Barium Pigment, bbls	lb.	.06⅛	.06⅜	.06⅛	.06⅜	.06	.06⅜
Calcium Pigment, bbls	lb.	.06⅛	.06⅜	.06⅛	.06⅜	.06	.06⅜
Toluidine, mixed, 900 lb drs, wks	lb.	.26	.27	.26	.27	.26	.27
Toluol, 110 gal drs, wks	gal.	...	.35	...	.35	...	.35
8000 gal tks, frt all'd	gal.	...	.30	...	.30	...	.30
Toner Lithol, red, bbls	lb.	.75	.80	.75	.80	.75	.80
Para, red, bbls	lb.	.75	.80	.75	.80	...	.75
Toluidine, bgs	lb.	...	1.35	...	1.35	...	1.35
Triacetin, 50 gal drs, wks	lb.	...	.36	...	.36	...	.36
Triamyl Borate, lcl, drs, wks	lb.	...	.27	...	.27	...	.27
Triamylamine, c-l, drs, wks	lb.	.77	1.25	.77	1.25	.77	1.25
Tributylamine, lcl, drs, wks	lb.	...	.70	...	.70	...	...
Tributyl citrate, drs, frt all'd	lb.	...	.45	...	.45	...	.45
Tributyl Phosphate, frt all'd	lb.	...	.50	...	.50	...	.50
Trichlorethylene, 600 lb drs, frt all'd E. Rocky Mts	lb	.089	.094	.089	.094	.089	.094
Tricresyl phosphate, tech, drs	lb.	.24½	.39	.24½	.39	.22½	.26½
Triethanolamine, 50 gal drs wks	lb.	.21	.22	.21	.22	.21	.30
tks, wks	lb.	...	.20	...	.20	.20	.25
Triethylene glycol, drs, wks	lb.	...	.26	...	.26	...	...
Trihydroxyethylamine Oleate, bbls	lb.	...	.30	...	.30	...	...
Stearate, bbls	lb.	...	.30	...	.30	...	...
Trimethylamine, c-l, drs, frt all'd E. Mississippi	lb.		1.00		1.00		1.00
Triphenylguanidine	lb.	.58	.60	.58	.60	.58	.60
Triphenyl Phosphate, drs	lb.	.34	.36	.34	.36		
Tripoli, airfloated, bgs, wks	ton	26.00	30 00	26.00	30.00	25.00	30.00
Turpentine (Spirits), c-l, NY dock, bbls	gal.	...	.31½	.31	.31½	.31	.47
Savannah, bbls	gal.	...	.26½	.25	.30¼	.25	.42
Jacksonville, bbls	gal.	...	.26	.26	.30¾	.25	.41
Wood Steam dist, bbls, c-l, NY	gal.	...	.31	.30	.31	.30	.44
Wood, dest dist, c-l, drs, delv E. cities	gal.	...	.36	.33	.36		
Urea, pure, 112 lb cases	lb.	.14½	.15½	.14½	.15½	.14½	.15½
Fert grade, bgs, c.i.f.	ton	...	...	...	...	...	...
c.i.f. S.A. points	ton	95.00	110.00	95.00	110.00	95.00	110.00
Dom, f.o.b., wks	ton	95.00	101.00	95.00	101.00	95.00	101.00
Urea Ammonia liq 55% NH_3, tks	unit	...	1.04	...	1.04	1.00	1.04
Valonia beard, 42%, tannin bgs	ton		50.00	50.00	52.00	35.00	52 00
Cups, 32% tannin, bgs	ton	35.50	37.50	35.50	37.50	31.50	36.00
Vanillin, ex eugenol, 25 lb tins, 2000 lb lots	lb.	...	3.10	...	3.10	3.10	3.65
Ex-guaiacol	lb.		3.00		3.00	3.00	3.55
Vermilion, English, kgs	lb.	1.60	1.69	1.60	1.69	1.60	1.90
Wattle Bark, bgs	ton	39.75	41.75	39.75	41.75	31.00	43.75
Extract, 60°, tks, bbls	lb	...	.043⅜	.043⅜	.045⅜	.035⅜	.045⅜

WAXES

Wax, Bayberry, bgs	lb.	.16⅞	.17	.16⅞	.17	.16½	.17½
Bees, bleached, white 500 lb slabs, cases	lb.	.39	.45	.39	.45	.38	.45
Yellow, African, bgs	lb.	.25	.26	.25	.26	.25	.30
Brazilian, bgs	lb.	.26½	.28½	.26½	.29	.27	.34
Chilean, bgs	lb.	.26½	.28½	.26½	.29	.27	.34
Refined, 500 lb slabs, cases	lb	.35	.39	.35	.39	.29½	.39
Candelilla, bgs	lb.	.13½	.14½	.13½	.14½	.13	.16½
Carnauba, No. 1, yellow, bgs	lb.	.41	.44	.41	.44	.42	.49
No. 2, yellow, bgs	lb.	.40	.41½	.40	.42	.41	.46½
No. 2, N. C., bgs	lb.	.39	.40	.39	.40	.38	.43
No. 3, Chalky, bgs	lb.	.33½	.35	.33	.35	.33	.40
No. 3, N. C., bgs	lb.	.33½	.35	.33½	.35½	.34	.43
Ceresin, dom, bgs	lb.	.08½	.11½	.08½	.11½	.08	.12
Japan, 224 lb cases	lb.	.10¼	.10½	.10¼	.10½	.09½	.11¼
Montan, crude, bgs	lb.	.11	.12	.11	.12	.11	.12
Paraffin, see Paraffin Wax.							
Spermaceti, blocks, cases	lb.	.23	.24	.23	.24	.23	.24
Cakes, cases	lb.	.24	.25	.24	.25	.24	.25
Whiting, chalk, com, 200 lb bgs c-l, wks	ton	12.00	14.00	12.00	14.00	12.00	14.00
Gilders, bgs, c-l, wks	ton		15.00		15.00		15.00
Wood Flour, c-l, bgs	ton	20.00	33.00	20.00	33.00	18.00	30.00
Xylol, frt allowed, East 10° tks, wks	gal.	...	.33	...	.33	...	.33
Coml, tks, wks, frt all'd	gal.	...	.30	...	.30	...	.30
Xylidine, mixed crude, drs	lb.	.35	.36	.35	.36	.35	.36
Zinc, Carbonate tech, bbls, NY	lb.	.14	.15	.14	.15	.12	.15
Chloride fused, 600 lb drs, wks	lb.	.04½	.046	.04½	.046	.04½	.046
Gran, 500 lb drs, wks	lb.	.05	.05¾	.05	.05¾	.05	.05¾
Soln 50%, tks, wks 100	lb.	...	2.25	...	2.25	2.00	2.25
Cyanide, 100 lb drs	lb.	.36	.38	.36	.38	.36	.38
Zinc dust, 500 lb bbls, c-l, delv	lb.	...	.0740	...	.0740	.0740	.094
Metal, high grade slabs, c-l, NY	100 lb.	...	5.35	...	5.35	5.35	7.85
E. St. Louis	100 lb.	...	5.00	...	5.00	5.00	7.50

		Current Market		1938 Low	1938 High	1937 Low	1937 High
Zinc (continued):							
Oxide, Amer, bgs, wks	lb.	.06¼	.07½	.06	.07½	.05¼	.07¾
French 300 lb bbls, wks	lb.	.06¼	.07¾	.06¼	.07¾	.05½	.07¾
Palmitate, bbls	lb.	.23	.25	.23	.25	.23	.25
Resinate, fused, pale, bbls	lb.		.10		.10	.09	.10
Stearate, 50 lb bbls	lb.	.20	.23	.20	.23	.20	.23
Zinc Sulfate, crys, 400 lb bbl, wks	lb.		.033		.033	.028	.033
Flake, bbls	lb.		.0375		.0375	.032	.0375
Sulfide, 500 lb bbls, delv	lb.	.09¼	.09¾	.09¼	.09¾	.09¼	.09¾
bgs, delv	lb.	.09	.09½	.09	.09½	.09	.09½
Sulfocarbolate, 100 lb kgs	lb.	.24	.26	.24	.26	.24	.26
Zirconium Oxide, crude, 73-75% grd, bbls, wks	ton	75.00	100.00	75.00	100.00		
kgs, wks	lb.	.04¼	.04½	.04¼	.04½		

Oils and Fats

Babassu, tks, futures	lb.	.06¾	nom.	.06¾	.06¾	.06¾	.11¼
Castor, No. 3, 400 lb bbls	lb.	.09¼	.10	.09¼	.10¾	.10¼	.10¾
Blown, 400 lb bbls	lb.	.11¼	.12	.11¼	.13	.12¼	.13
China Wood, drs, spot NY	lb.	.15	.15¼	.15	.15¼	.12½	.23
Tks, spot NY	lb.		.15	.15	.15½	.118	.23
Coast, tks	lb.		nom.			.133	.23
Coconut, edible, bbls NY	lb.		.09½		.09½	.09½	.15
Manila, tks, NY	lb.	.04	.04¼	.04	.04¼	.04	.09½
Tks, Pacific Coast	lb.	.03⅝	.03¾	.03⅝	.03¾	.03¾	.08⅞
Cod, Newfoundland, 50 gal bbls	gal.	.52	nom.	.52	.52	.51	.52
Copra, bgs, NY	lb.		.0230	.0230	.0235	.0235	.055
Corn, crude, tks, mills	lb.		.07	.06⅝	.07	.06½	.10¾
Refd, 375 lb bbls, NY	lb.	.09¼	.09½	.09¼	.09½	.09	.13¼
Degras, American, 50 gal bbls, NY	lb.	.07¾	.08¼	.07½	.08¼	.07½	.08¼
English, bbls, NY	lb.	.07¾	.08¼	.07½	.08¼	.07½	.08¼
Greases, Yellow	lb.	.05⅜	.05½	.04¾	.05½	.04¼	.09
White, choice bbls, NY	lb.	.06¾	.07	.06¾	.07	.06¾	.10¼
Lard Oil, edible, prime	lb.		.12¼	.12¼	.12¾	.12¾	.16¾
Extra, bbls	lb.		.10¾		.10¾	.10¾	.13½
Extra, No. 1, bbls	lb.		.09¾	.09¼	.09¾	.09¼	.13½
Linseed, Raw less than 5 bbl lots	lb.		.110		.110	.107	.121
bbls, c-l, spot	lb.		.102		.102	.099	.113
Tks	lb.		.096		.096	.093	.107
Menhaden, tks, Baltimore	gal.	.37½	nom.	.34½	.37½	.34	.45
Refined, alkali, drs	lb.	.087	.089	.08	.089	.08	.10
Tks	lb.		.081	.074	.081	.074	.09
Kettle bodied, drs	lb.	.097	.099	.09	.099	.09	.11
Light pressed, drs	lb.	.081	.0840	.074	.0840	.074	.094
Tks	lb.		.0740	.067	.0740	.067	.084
Neatsfoot, CT, 20°, bbls, NY	lb.		.16¾	.16¾	.17¼	.16¾	.18¼
Extra, bbls, NY	lb.		.10	.09½	.10	.09½	.13¾
Pure, bbls, NY	lb.		.12¼	.11¾	.12¼	.11¾	.14¼
Oiticica, bbls	lb.	.12½	.12¾	.12½	.12¾	.10⅞	.17
Oleo, No. 1, bbls, NY	lb.		.09½	.09½	.10½	.10½	.14½
No. 2, bbls, NY	lb.		.09	.09	.10	.10	.14
Olive, denat, bbls, NY	gal.	1.05	1.15	1.05	1.20	1.15	1.65
Edible, bbls, NY	gal.	2.35	nom.		2.35	2.20	2.50
Foots, bbls, NY	lb.	.09¼	.09½	.09¼	.09⅞	.09⅝	.12½
Palm, Kernel, bulk	lb.		.04¼	.04¼	.04½	.04½	.08⅛
Niger, cks	lb.		.04¼	.04	.04½	.04	.07¼
Sumatra, tks	lb.		.0375		.0375	.0375	.06½
Peanut, crude, bbls, NY	lb.	.07	nom.		.07	.06¼	.10⅝
Tks, f.o.b. mill	lb.	.06¾	nom.	.06⅝	.06¾	.06½	.10¼
Refined, bbls, NY	lb.	.10	nom.		.10	.10	.13½
Perilla, drs, NY	lb.	.11	.11¼	.11	.11¾	.11	.13½
Tks, Coast	lb.		.10½	.10½	.11	.105	.13
Pine, see Pine Oil, Chemical Section.							
Rapeseed, blown, bbls, NY	lb.	.14½	.14¾	.14½	.14¾	.13	.14¾
Denatured, drs, NY	gal.	.90	.91	.90	.91	.85	.97
Red, Distilled, bbls	lb.	.09⅝	.10⅝	.09⅝	.10⅝	.09⅝	.12⅝
Tks	lb.	.08¾	.09¾	.08¾	.09¾	.08¾	.10¾
Sardine, Pac Coast, tks	gal.		.43	.37	.43	.35	.55
Refined alkali, drs	lb.	.087	.089	.08	.089	.08	.10
Tks	lb.		.081	.074	.081	.074	.09
Light pressed, drs	lb.	.081	.083	.074	.083	.074	.094
Tks	lb.		.074	.067	.074	.067	.084
Sesame, yellow, dom	lb.	.10¼	.10½	.10¼	.10½	.10¼	.13¼
White, dom	lb.	.10¼	.10½	.10¼	.10½	.10¼	.13¼
Soy Bean, crude							
Dom, tks, f.o.b. mills	lb.	.065	.067	.06	.067	.06	.10½
Crude, drs, NY	lb.	.073	.077	.066	.077	.066	.11½
Ref'd, drs, NY	lb.	.083	.094	.078	.094	.078	.12½
Tks	lb.	.077	.079	.072	.079	.072	.11½
Sperm, 38° CT, bleached, bbls NY	lb.	.10	.102	.10	.102	.096	.102
45° CT, bleached, bbls, NY	lb.	.093	.095	.093	.095	.089	.095
Stearic Acid, double pressed dist bgs	lb.	.11	.12	.11	.12	.11	.13½
Double pressed saponified bgs	lb.	.11¼	.12¼	.11¼	.12¼	.11¼	.13¾
Triple pressed dist bgs	lb.	.14	.15	.14	.15	.14	.16½
Stearine, Oleo, bbls	lb.	.07¼	.08	.07	.08	.07	.11½
Tallow City, extra loose	lb.		.06⅜	.05⅞	.06⅜	.05⅞	.09¼
Edible, tierces	lb.		.07¼	.06⅞	.07¼	.06⅞	.10¼
Acidless, tks, NY	lb.		.09¼	.09	.09¼	.09	.13
Turkey Red, single, bbls	lb.	.08	.08½	.08	.08½	.08	.08½
Double, bbls	lb.	.12½	.13	.12½	.13	.12½	.13
Whale:							
Winter bleach, bbls, NY	lb.	.098	.10	.098	.10	.091	.111
Refined, net, bbls, NY	lb.	.094	.096	.094	.096	.087	.107

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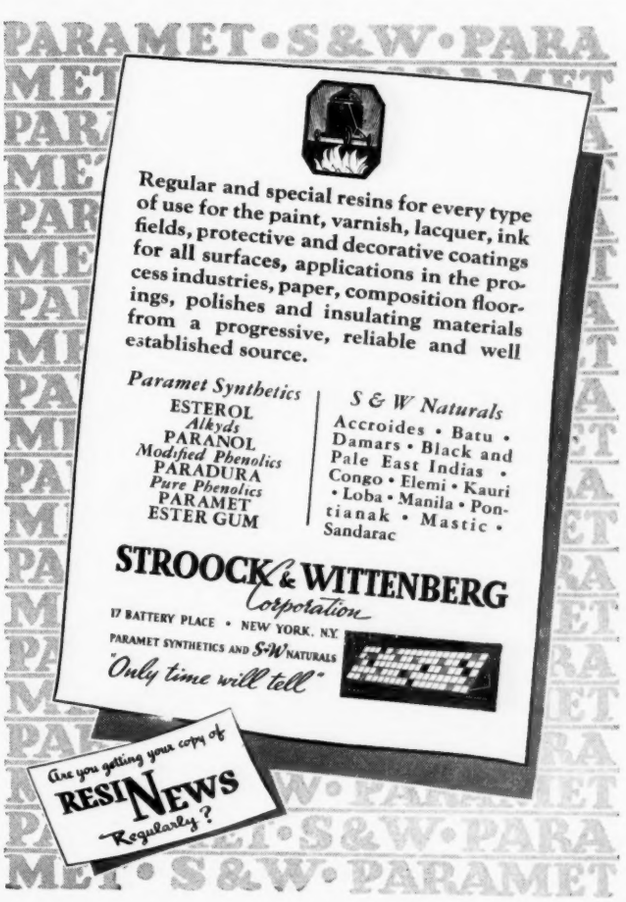
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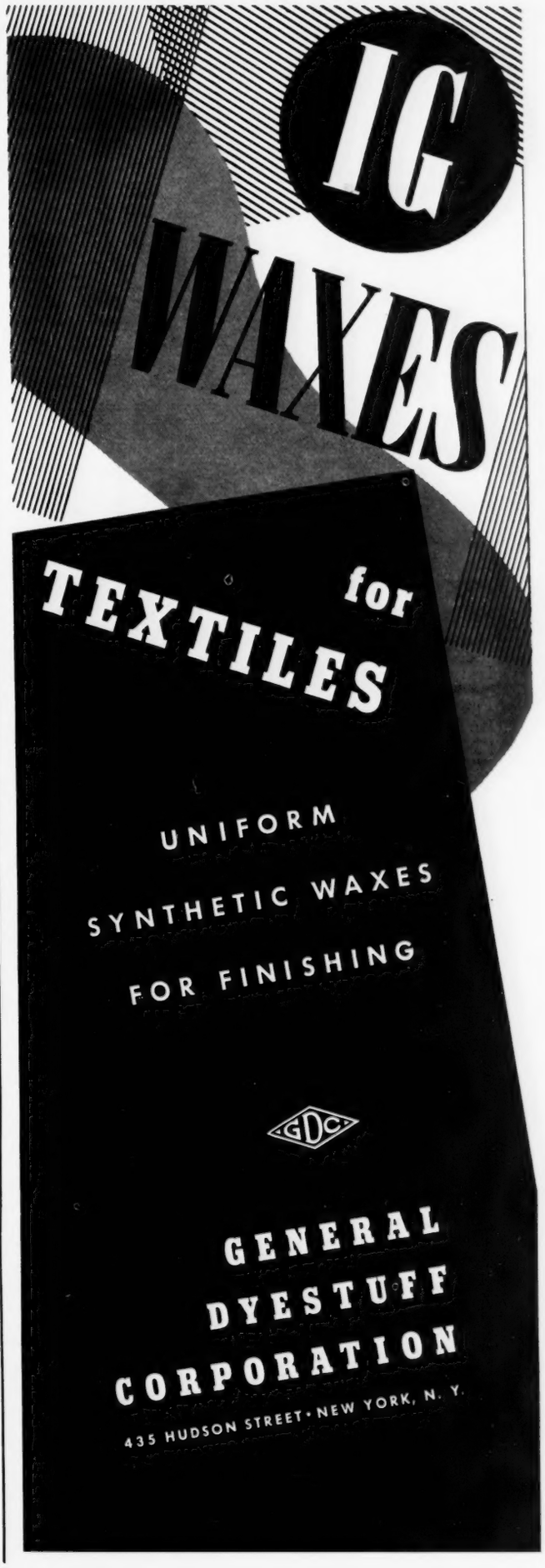

"We"—Editorially Speaking

97 ADMITS CHEW WILL FRAUD
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Philadelphia Nurse Says He Obtained Signature by Ruse

Special to THE NEW YORK TIMES.

Carl Hazard submits the above newspaper heading as a perfect example of a false alarm.

❖❖❖❖

Contributed by a poet so modest we dare not even print his initials—

CHOOSE YOUR BIOGRAPHY

You must be alert
To be a druggist's clerk,
And not let it get you down;

And a Leader in Chlorine
Is not too boring,
In spite of an executive frown.

Pushing Back Horizons
Isn't surprising,
For one who has worn such a crown;

But to then be a jobber
And not called a robber
Is certainly going to town.

(With apologies to B. F. in CUE)

❖❖❖❖

Of the $12,500,000,000 collected in taxes in the United States last year, 70 per cent. or $8,750,000,000 was in hidden taxes. In other words, each person in the country paid approximately $67.30 into the tax coffers without being aware of it.

❖❖❖❖

How do YOU like our new mousetrap? (See letter from R. B. Lebo, on page 132, and then take a look at the blue paper section.)

❖❖❖❖

Question for the technocrats: If the linotype machine sets six times as much type as the printer can by hand, how many fewer typesetters are there today than in 1890 when this labor-saving device came into general use? Answer: There are five times as many linotype operators today as there were hand typesetters forty years ago.

❖❖❖❖

The offer of Lydia Pinkham to sponsor the Low Brow Round Table of the Chemists' Club on a nation-wide hook-up has been turned down because Ned Brundage and Bob Quinn both wanted to play Charlie McCarthy.

Believe it or not—

The full name of the inventor of the well known oil cracking process is Carbon Petroleum Dubbs.

Writing to the *New York Times* Walter Rautenstrauch says, "We manufacturers must—."

Three big hospitals of the U. S. Veterans Bureau buy high-test hypochlorite from Japan.

Howard Farkas and Carl Funke are collaborating on an anthology of verse.

Francis Turner can speak Norwegian like a native—of Minnesota.

❖❖❖❖

The decoration of the month, with palms and a couple of stars, goes to Lammot du Pont for his "twelve new products." That forty per cent. of his company's sales today come from these products developed within the past ten years is a fact that makes crystal clear to anyone the true meaning of chemical progress.

❖❖❖❖

Excuse it please, but you can get a reprint of "Why Chemists Get Fired" for fifteen cents or ten of them for one dollar: the address is P. O. Box 1405, New Haven, Conn.

Fifteen Years Ago

From our issues of February, 1923

Otto E. Schaefer elected president, Drug & Chemical Club.

S. B. Penick & Co. purchases building in Asheville, N. C.

R. R. M. Carpenter becomes general manager, du Pont's Pyralin Department.

Henry Ford awards contract for erection largest chemical plant in world at Iron Mountain, Mich.

Corn Products Co. obtains control of Standard Development Co., subsidiary of Standard Oil (N. J.).

U. S. Industrial Alcohol moves to 110 E. 42 St., N. Y.

Freeport Sulphur begins construction of $2,000,000 plant at Hoskins Mound, Tex.

Tubize Co., Hopewell, Va., increases plant capacity twenty-five per cent.

Certainly there is chemistry in radio, especially at WHK-WCLE in Cleveland where executives spend an unusual amount of time in research, analysis, test and survey of WHK-WCLE programs.

This sort of glorification of the American chemist provokes us much more than that murderous advertisement of Peaceways, which, despite violent protests, is repeated in this month's *Fortune*. Why can't any commercial artist ever learn to pick up a test-tube by its neck and stop burning his fingers? As for the copywriters—well, we've made a careful chemical analysis of WHK-WCLE and discover that it contains two parts of tungsten, one each of hydrogen, potassium, and carbon. The LE is baffling, but the photoelectric eye reveals a misprint for lithium. So, after all, this mysterious compound proves in the end simply to be our old friend "blah."

❖❖❖❖

Nobody in the chemical world believes that the photograph of Jim Farley's double, published recently in *Life*, is nearly as near a real double as Victor's Otto Raschke is in real life.

❖❖❖❖

In the interest of economy of breath, time, ink and so on, something ought to be done about the name of the Thirteenth Annual Dinner of the Drug and Chemical Trades Section of the New York Board of Trade and Transportation. It's not that kind of a party at all. It's a wow!

❖❖❖❖

Why not call it the Wow Dinner? Call it what you please; but don't miss it.

❖❖❖❖

Of course you're going—why, my dear, you positively don't exist in chemical circles if you're left out of that party.

❖❖❖❖

Toodle-de-doo: We'll be seeing you on the third at the Waldorf.

TECHNOLOGY DEPT.

VOL. 42 CHEMICAL INDUSTRIES NO. 2
Feb. '38 *Statistical and Technical Data Section* Part 2

State of Chemical Trade

Current Statistics (Jan. 31, 1938)—p. 3

WEEKLY STATISTICS OF BUSINESS

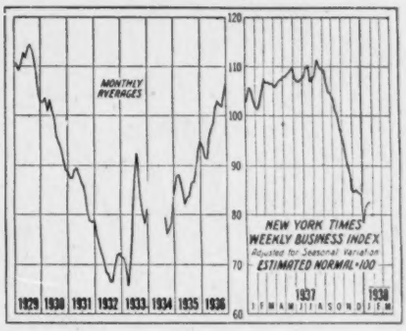
Week Ending	Carloadings 1937	Carloadings 1936	Carloadings % of Change	Electrical Output* 1937	Electrical Output* 1936	Electrical Output* % of Change	Jour. of Com. Price Index	Nat'l Chem. & Drugs	Fertilizer Ass'n Price Indices: Fats & Oils	Fert. Mat.	Mixed Fert.	All Groups	†Labor Dept. Chem. & Drug Price Index	% Steel Activity	N. Y. Times Index Bus. Act.	Fisher's Index Pur. Power
Dec. 18	603,292	730,048	—17.4	2,202,200	2,278,303	— 3.3	79.5	95.5	62.4	72.9	79.8	78.0	79 1	23.5	84.6	119.2
Dec. 24	460,367	562,578	—18.2	2,085,186	2,274,508	—*y*	78.9	95.5	62.4	72.2	79.8	78.1	79.2	19.2	84.7	120.2
	1938	1937		1938	1937											
Jan. 1	457,359	588,263	—22.3	1,998,135	2,080,954	—*y*	78.8	95.5	78.8	72 2	79.8	78.0	79.2	25.6	78.3	120.3
Jan. 8	552,314	700,046	—21 1	2,139,582	2,244,030	— 4.7	79.9	95.3	62.2	72.4	79.8	77.9	79.2	27.8	81.2	120.1
Jan. 15	580,600	696,083	—16.6	2,115,134	2,264,125	— 6.6	80.3	95.3	63.0	72.5	79.8	78.5	79 5	29.8	82.0	119.2
Jan. 22	570,333	665,346	—14.3	2,108,968	2,256,795	— 6.6	79.2	95.3	64.2	72.5	79.8	77.8	...	32.7	82.3	119.9
Jan. 29	.....	.....	....	.....	.....	.....	78.7	...	...	...	...	...	...	...	...	....

* K.W.H., 000 omitted; † 1926-1928 = 100.0; *y* No comparison made because of holidays.

MONTHLY STATISTICS

CHEMICAL:	December 1937	December 1936	November 1937	November 1936	October 1937	October 1936
Acid, sulfuric (expressed as 50° Baumé, short tons. Bureau of the Census)						
Total prod. by fert. mfrs.	.....	.....	205.796	176.500	212 258	169 814
Consumpt. in mfr. fert.	.....	.....	166.778	175.123	166 031	163.265
Stocks end of month	.....	.....	91.498	74.563	76.403	74.604
Alcohol, Industrial (Bureau Internal Revenue)						
Ethyl alcohol prod., proof gal.	17.261.669	19.913,228	18,179.320	20.170.272	18,786.249	22 086.895
Comp. denat. prod., wine gal.	1.826.806	1.831,934	4.127.664	5.556.989	7.846.286	7.893.330
Removed, wine gal.	1.841.127	1.990.349	4.266.603	5.955.957	8.272.345	8.847.612
Stocks end of mo., wine gal.	546.647	677,897	564.669	838.433	709,584	1.239.021
Spec. denat. prod., wine gal.	5.185.096	9.284.288	5.481.866	7.026.720	6.523,178	7.179.187
Removed, wine gal.	5.128.171	9.298,963	5,693,010	6.990.141	6.529.424	7.283.737
Stocks end of mo., wine gal.	606.222	452,613	554,777	472.483	765.029	442.294
Ammonia sulfate prod. tons *a*	43.211	67,749	50,234	63,059	62 806	63.422
Benzol prod., gals. *b*	6.340.000	10.376.000	7,472.000	9,633,000	9.610.000	9.729 000
Byproduct coke prod., tons *a*	2.829.225	4.354.000	3,225.556	4,054.400	4.036.046	4.071.249
Cellulose Plastic Products (Bureau of the Census)						
Nitrocellulose sheets, prod., lbs.	412.887	1,054,662	824,170	1.210.233	1,018.760	1,745,971
Sheets, ship., lbs.	514.027	1,151,581	736,726	1,082,963	1,109.000	1,252.723
Rods, prod., lbs.	148,889	259,506	185.891	301.738	174,950	338,480
Rods, ship., lbs.	139,682	255,832	158.721	246,133	258,351	271,598
Tubes, prod., lbs.	40,701	83,373	56,957	82,104	89,760	121.704
Tubes, ship., lbs.	46,257	71,154	82,920	91,254	102,257	123,949
Cellulose acetate, sheets, rods, tubes:						
Production, lbs.	624.078	1.255.494	782.929	1.437.526	919.432	1.461.782
Shipments, lbs.	602.887	1,111,530	678.319	1,312.766	962.702	1.315.752
Methanol (Bureau of the Census)						
Production, crude, gals.	461.539	548,982	423.315	520.722	423.792	511.541
Production, synthetic, gals.	3.887.741	2.009.952	3.562.372	3.417,755	3.532,091	3,278,052
Pyroxylin-Coated Textiles (Bureau of the Census)						
Light goods, ship., linear yds.	.....	.....	2.257.102	3.199.265	2.788.158	3.241.972
Heavy goods, ship., linear yds.	.....	.....	1.351.823	1.894,251	1.828,913	2.166.053
Pyroxylin spreads, lbs., *c*	.....	.....	3.762.146	5.320.813	4.944,517	6.080.964
Exports (Bureau of Foreign & Dom. Commerce)						
Chemicals and related prod. *d*	$10,785	$10,484	$11,521	$8,724	$12,893	$10,851
Crude sulfur *d*	$781	$507	$865	$691	$1,831	$807
Coal-tar chemicals *d*	$1,113	$1,539	$991	$864	$1,073	$980
Chemical specialties *d*	$1,856	$2,062	$2,216	$1,558	$2,459	$1,970
Industrial chemicals *d*	$1,939	$1,908	.....	$1,564	$2,568	$1,987
Imports						
Chemicals and related prod. *d*	$8,261	$8,334	$7,804	$6,256	$8,506	$7,719
Coal-tar chemicals *d*	$1,482	$1,960	$1,229	$1,286	$1,948	$1,330
Industrial chemicals *d*	$1,551	$2,078	$2,033	$1,665	$1,745	$1,741
Payrolls (U. S. Dept. of Labor, 3 year av., 1923-25 = 100)						
Chemicals and allied prod., including petroleum	124.4	118.3	132.1	114.7	137.5	114.4
Other than petroleum	120.4	118.0	129.6	113.3	116.1	113.9
Chemicals	130.9	132.5	141.7	127.5	150.6	124.7
Explosives	100.3	98.0	106.6	98.3	110.5	96.2
Employment (U. S. Dept. of Labor, 3 year av., 1923-25 = 100)						
Chemicals and allied prod., including petroleum	116.0	119.3	122.7	119.7	126.5	120.3
Other than petroleum	115.1	119.3	122.4	119.4	126.7	120.2
Chemicals	122.4	129.1	129.8	130.0	135.2	129.9
Explosives	94.7	93.2	95.4	95.4	97.3	93.2
Stocks of chemicals, etc.:**						
Finished	.....	.....	156	121	147	123
Raw material	.....	.....	129	110	122	107
FERTILIZER:						
Exports (short tons, Nat. Fert. Association)						
Fertilizer and fert. materials	.....	.....	170,676	138,442	200.182	194,237
Ammonium sulfate	.....	.....	15.103	3,876	10,447	7,735
Total phosphate rock	.....	.....	95,869	96,923	136.155	125,299
Total potash fertilizers	.....	.....	15,378	5,760	3,276	6,400

INDUSTRIAL TRENDS



General: Moderate improvement from December low point; retail sales most encouraging factor; *N. Y. Times* Index of Business Activity rises from 78.3 on Jan. 1 to 82.3 on Jan. 22.

Steel: Steadily gaining; activity at 32.7% on Jan. 22 against 19.2% on Dec. 24; sustained optimism still lacking.

Employment: Net drop of 300,000 jobs reported in December; weekly payroll loss $15,800,000.

Inventories: Higher at the year-end than generally supposed.

Stock Market: Higher in first part of January but followed by sharp declines, bringing values in most cases down to lows of '37.

Commodity Prices: Followed upward trend in stock market early in January but lost ground in last 2 weeks of the month.

Carloadings: Well below corresponding weeks of previous year.

Electrical Output: Running below totals for same weeks of '37.

Shoes: Production down 30% last month under year-ago level; a 10% price cut, however, has stimulated sales and some factories are expected to be running close to capacity during the next 60-90 days.

Paper: Producers report seasonal improvement.

Textiles: Current activity 40% below last year's level and back to the 1932-34 bed-rock figures. Trading in grey goods better and prices are firmer. Past 2 weeks, moreover, has seen a sturdy step-up—10%—in mill operations.

Chemical: Roger Babson states: "The chemical business is my nomination for

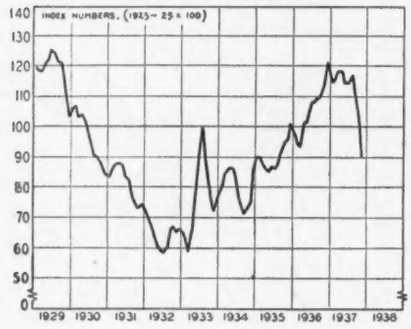
State of Chemical Trade
Current Statistics (Jan. 31, 1938)—p. 3

State of Chemical Trade

Current Statistics (Jan. 31, 1938)—p. 4

the 'Industry of 1938.' Its research progress, its all-inclusive diversification, its conservative management, and its protection against war, inflation, politics, and labor qualify it for such nomination."

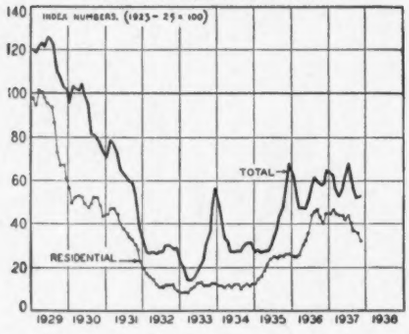
INDUSTRIAL PRODUCTION *



* Adjusted for seasonal variation.

Outlook: Sentiment somewhat better than at the close of the year, although first wave of enthusiasm over "get-togethers" in Washington has subsided. There are straws in the wind, however, that business is slowly turning around. A good last half is expected in most quarters. Consensus of purchasing agents in the National Association of Purchasing Agents is that improvement is under way, but covering for current needs only is still advisable.

CONSTRUCTION CONTRACTS AWARDED * •



* Adjusted for seasonal variation.
• Three-month average.

Factors which contributed to the decline in business: 1. Accumulation of inventories in late 1936 and early 1937; 2. Decline in Government spending; 3. Fear of further labor troubles; 4. Increased costs, particularly labor costs and taxes; 5. New enterprises discouraged by capital gains tax; 6. Fear of legislation unfavorable to business.

Favorable factors in the long range business outlook: 1. Large shortage of goods still remains; 2. Large investment funds available at low interest rates; 3. Construction industry still at depression level; 4. Period of prosperity should follow the severe 1929-35 depression; 5. New developments and new industries should eventually stimulate business.

MONTHLY STATISTICS (cont'd)

FERTILIZER (cont'd)	December 1937	December 1936	November 1937	November 1936	October 1937	October 1936
Imports (short tons, Nat. Fert. Association)						
Fertilizer and fert. materials	.....	.....	172,329	110,881	174,719	187,096
Ammonium sulfate	.....	.....	13,339	17,827	3,075	33,684
Sodium nitrate	.....	.....	23,966	3,005	3,216	21,855
Total potash fertilizer	.....	.....	78,223	45,790	105,237	64,923
Superphosphate e (Nat. Fert. Association)						
Production, bulk	357,479	331,160	324,514	331,384	333,553	308,537
Shipments, total	190,089	197,518	179,112	160,924	227,368	256,995
Northern area	88,274	85,916	96,182	70,771	132,543	141,814
Southern area	101,815	111,602	82,930	90,153	94,825	115,181
Stocks, end of month, total	1,845,001	1,535,208	1,607,475	1,330,893	1,416,946	1,093,265
Tag Sales (short tons, Nat. Fert. Association)						
Total, 17 states	186,941	178,204	123,465	99,916	146,913	170,432
Total, 12 southern	184,948	177,978	122,888	99,697	126,587	137,441
Total, 5 midwest	1,993	226	577	219	20,326	32,991
Fertilizer payrolls	81.9	71.6	77.4	63.1	83.2	69.7
Fertilizer employment	80.0	80.4	75.3	69.8	81.5	76.9
Value imports, fert. and mat. *d*	$4,318	$3,487	$3,633	$2,391	$3,689	$3,760
Value exports, fert. and mat. *d*	$1,291	$673	$1,952	$1,357	$1,736	$1,985
GENERAL:						
Acceptances, outst'd'g *f*	$343	$373	$348	$349	$346	$330
Coal prod., anthracite, tons	4,752,000	4,947,000	4,302,000	4,334,000	4,684,000	4,608,000
Coal prod., bituminous, tons	36,226,000	45,756,000	36,255,000	41,879,000	40,722,000	43,321,000
Com. paper outst'd'g *f*	$279	$215	$311	$191	$323	$199
Failures, Dun & Bradstreet	932	692	786	688	768	611
Factory payrolls *i*	80.9	95.2	89.5	90.5	100.2	89.0
Factory employment *i*	88.5	98.1	94.7	96.7	100.4	96.7
Merchandise imports *i*	$203,700	$240,230	$212,377	$196,400	$224,391	$212,692
Merchandise exports *i*	$319,756	$229,800	$314,682	$225,766	$336,136	$264,708
GENERAL MANUFACTURING:						
Automotive production	326,234	498,710	360,063	394,890	329,876	224,688
Boot and shoe prod., pairs	.....	33,380,528	21,040,906	30,432,839	28,950,814	39,361,698
Bldg. contracts, Dodge *j*	$209,451	$199,696	$198,465	$208,204	$202,081	$225,768
Newsprint prod., U. S. tons	79,537	80,048	79,338	79,853	78,352	81,027
Newsprint prod., Canada, tons	293,038	289,312	302,236	285,771	314,594	301,106
Plate glass prod., sq. ft.	.....	7,371,236	12,517,311	13,083,963	14,854,910	20,752,657
Steel ingot prod., tons	1,472,241	4,424,367	2,153,781	4,323,025	3,392,691	4,534,246
% steel activity	25.36	76.42	38.22	76.94	58.31	78.15
Pig iron prod., tons	1,478,843	3,115,037	2,006,724	2,947,365	2,892,629	2,991,887
U. S. consumpt. crude rub., tons	29,160	49,626	33,984	50,433	38,707	49,637
Cotton consumpt., bales	433,058	694,841	484,819	625,794	526,464	651,086
Cotton spindles oper.	22,328,472	24,090,204	22,791,550	23,805,520	23,724,272	23,662,464
Silk deliveries, bales	21,982	41,627	31,749	40,401	36,002	43,093
Rayon ship. index *p*	242	713	252	714	366	699
Rayon employment *i*	336.8	362.4	374.0	364.0	387.5	361.5
Rayon payrolls *i*	313.5	321.3	360.3	298.2	391.0	307.6
Soap employment *i*	94.6	98.8	100.4	102.5	102.8	107.1
Soap payrolls *i*	111.3	104.3	116.9	101.6	121.1	105.3
Paper and pulp employment *i*	109.3	112.8	113.6	111.9	117.3	110.7
Paper and pulp payrolls *i*	99.2	108.6	105.4	104.5	116.7	101.9
Leather employment *i*	78.6	98.4	82.9	98.4	89.6	97.2
Leather payrolls *i*	78.4	105.0	82.7	100.8	95.0	99.0
Glass employment *i*	99.5	100.6	106.7	97.6	109.9	103.6
Glass payrolls *i*	97.1	95.1	111.9	99.4	119.2	103.0
Rubber prod. employment *i*	84.8	101.9	90.9	100.0	97.7	97.9
Rubber prod. payrolls *i*	76.5	104.8	82.0	101.2	94.3	96.8
Dyeing and fin. employment *i*	105.4	122.8	108.8	117.8	112.2	114.8
Dyeing and fin. payrolls *i*	86.8	116.4	89.0	100.6	94.6	97.7
MISCELLANEOUS:						
Oils and Fats, price index	85.6	128.2	93.1	114.2	97.2	112.2
Price index K, rosin	95.5	157.7	102.6	119.6	119.6	102.3
Gasoline prod., bbls.	.....	.....	48,180,000	43,004,000	51,461,000	45,905,000
Cottonseed Oil consumption, bbls.	358,328	351,616	435,386	264,192	484,633	242,088
Price index, turpentine	50.3	80.6	51.9	73.5	53.2	70.1
PAINT, VARNISH, LACQUER, FILLERS:						
Sales 680 establishments	.....	.....	$26,105,315	$29,488,620	$32,791,845	$35,354,930
Trade sales (580 establishments)	.....	.....	$12,790,654	$13,894,427	$16,256,222	$17,735,136
Industrial sales, total	.....	.....	$10,889,719	$13,182,544	$13,447,493	$14,479,453
Paint and varnish sales	.....	.....	$7,169,000	$8,829,357	$8,761,135	$10,221,164
Lacquer sales	.....	.....	$3,720,719	$4,353,187	$4,686,358	$4,258,289
Plastic paints, lbs.	.....	.....	443,911	460,941	486,887	530,935
Cold-water paints, lbs.	.....	.....	2,717,265	1,442,672	3,225,794	2,131,765
Calcimines, lbs.	.....	.....	5,238,060	5,382,585	5,762,921	6,914,947

a Bureau of Mines; *b* Crude and refined plus motor benzol, Bureau of Mines; *c* Based on 1 lb. of gun cotton to 7 lbs. of solvent, making an 8-lb. jelly; *d* 000 omitted, Bureau of Foreign & Domestic Commerce; *e* Expressed in equivalent tons of 16% A.P.A.; *f* 000,000 omitted at end of the month; *i* U. S. Dept. of Labor, 3 year average, 1923-25 = 100; *j* 000 omitted, 37 states; *p* Rayon Organon, 1923-25 = 100; *q* 680 establishments, Bureau of the Census; *r* Classified sales, 580 establishments, Bureau of the Census; *s* 53 manufacturers, Bureau of the Census; *v* In thousands of bbls., Bureau of the Census; ** Indices, Survey of Current Business, U. S. Dept. of Commerce.

Comparison of Average Price and Total Value of Chemical Stocks on the N. Y. Stock Exchange with All Stocks Listed (1936-1937)

	Chemical Group						All Stocks	
	Common Stocks		Preferred Stocks		Common and Preferred Stocks			
	Av. Price	Total Market Value	Av. Price	Total Market Value	Av. Price	Total Market Value	Av. Price	Total Market Value
1936								
Jan. 1	$66.48	$4,696,641,052	$97.25	$382,342,653	$68.10	$5,078,983,705	$35.62	$46,945,581,555
Feb. 1	69.59	4,919,965,893	97.92	384,979,138	71.09	5,304,945,031	37.98	50,164,547,052
Mar. 1	71.07	5,026,886,400	96.89	336,928,262	72.28	5,363,814,662	38.71	51,201,637,902
Apr. 1	70.82	5,357,881,395	97.59	339,378,174	72.00	5,697,259,569	38.85	51,667,867,515
May 1	64.36	4,985,906,405	95.22	330,087,307	65.68	5,315,993,712	35.74	47,774,402,524
June 1	67.14	5,203,974,305	95.42	330,340,479	68.35	5,534,314,784	37.35	49,998,732,557
July 1	69.09	5,383,065,424	94.66	314,029,823	70.13	5,697,095,247	38.00	50,912,398,322
Aug. 1	74.37	5,799,134,316	91.93	319,988,706	75.12	6,119,123,022	40.30	54,066,925,315
Sept. 1	73.31	5,718,238,471	92.18	320,917,155	74.12	6,039,155,626	40.56	54,532,083,004
Oct. 1	73.52	5,733,751,221	88.83	326,162,867	74.20	6,059,914,088	40.88	55,105,218,329
Nov. 1	77.88	6,074,541,379	90.23	331,609,176	78.43	6,406,150,555	43.36	58,507,236,527
Dec. 1	80.95	6,314,531,594	91.47	336,082,981	81.42	6,650,614,575	44.26	60,019,557,197
1937								
Jan. 1	78.98	6,161,509,866	92.73	340,723,767	79.60	6,502,233,633	44.02	59,878,127,946
Feb. 1	80.84	6,306,713,023	93.29	342,765,199	81.40	6,649,478,222	45.30	61,911,871,699
Mar. 1	79.81	6,230,497,825	93.33	342,868,699	80.41	6,573,366,524	45.56	62,617,741,160
Apr. 1	77.61	6,152,685,904	93.21	342,421,989	78.30	6,495,107,893	45.26	62,467,777,302
May 1	72.44	5,840,680,972	91.02	334,317,411	73.25	6,174,998,383	41.80	57,962,789,210
June 1	73.97	5,964,633,959	90.38	332,505,421	74.69	6,297,139,340	41.27	57,323,818,936
July 1	71.80	5,857,632,474	89.42	328,240,013	72.56	6,185,872,487	39.21	54,882,327,205
Aug. 1	75.67	6,200,439,269	91.58	336,174,522	76.35	6,535,613,791	42.30	59,393,594,170
Sept. 1	73.69	6,038,992,744	91.16	335,289.081	74.44	6,374,281,825	40.51	56,623,913,315
Oct. 1	66.29	5,436,004,303	87.53	326,331,896	67.22	5,762,336,199	35.07	49,034,032,639
Nov. 1	59.32	4,867,375,760	88.51	374,234,210	60.75	5,241,609,970	31.84	44,833,215,320
Dec. 1	53.22	4,402,552,000	86.57	366,011,045	54.84	4,768,563,045	28.92	40,716,032,190
1938								
Jan. 1	52.90	4,376,612,248	84.88	364,095,586	54.48	4,740,707,834	27.53	38,869,140,625

Price Trend of Representative Chemical Company Stocks

	Dec. 31	Jan. 7	Jan. 14	Jan. 21	Jan. 28	Jan. 31	Net Gain or loss last mo.	Price on Jan. 31, 1937	1937-38 High	1937-38 Low
Air Reduction	49½	53½	55	57	46½	47¾	— 1¾	75½	80¼	44½
Allied Chemical	162½	173½	171	171	161	158	— 4½	236	258½	145
Amer. Cyanamid	22⅜	24	25½	24¼	23⅞	24	+ 1⅛	33½	37	17⅝
Amer. Agric. Chem.	58	60*	...	...	...	57	— 1	95¼	101½	53½
Columbian Carbon	67	70½	...	70	66	65	— 2	120¼	125¾	65
Commercial Solvents	7⅜	8¼	9¼	8⅞	8	8	+ ⅝	19⅝	21¼	5
Dow Chemical	91	94⅞	96	...	88	88‡	— 3	...	...	...
Du Pont	112	114½	118	113⅜	110	111½	— ½	172¾	182	98
Hercules Powder	52	52	56	55¾	52½	52½	+ ½	181	64	50
Mathieson Alkali	22¾	24½†	25½	...	23½	23¾	+ 1	38⅞	41¾	22
Monsanto Chemical	84	91	87¾	86½	79	78½	— 5½	94½	107½	71
Std. of N. J.	45¼	49⅞	49½	49⅞	46⅜	47	+ 1¾	69½	76	42
Texas Gulf Sulphur	27¼	30¾	32¼	33	30⅛	30¼	+ 3	40⅜	44	23¾
Union Carbide	73½	74¾	76	77	71⅞	71¼	— 2¼	105¼	111	61¼
U. S. Ind. Alcohol	21	21	22	21¼	19⅝	19½	— 1½	39⅝	43⅝	16⅛

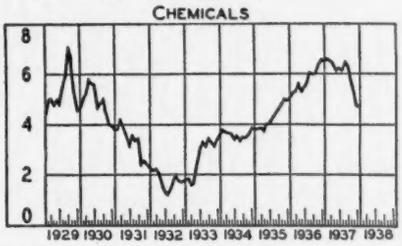
* Jan. 5; † Jan. 6; ‡ Jan. 28.

Earnings Statements Summarized

Company:	Annual dividends	Net income 1937	Net income 1936	Common share earnings 1937	Common share earnings 1936	Surplus after dividends 1937	Surplus after dividends 1936
American Agricultural Chemical:							
Six months, Dec. 31	*y*$7.75	$132,647	$161,694	$.63	$.76	.....	.....
Atlas Powder:							
n Year, Dec. 31	*y*3.75	1,433,871	1,430,080	4.40	4.21	.....	.....
Atlantic Refining:							
n Year, Dec. 31	1.00	9,942,000	7,342,197	3.51	2.59	.....	.....
Cook Paint & Varnish:							
Eleven months, Nov. 30	§.60	456,814	.....	1.51	...	.....	.....
Du Pont (DD):							
n Year, Dec. 31	*y*6.25	88,031,943	89,884,449	7.29	7.56	.....	.....
Freeport Sulphur:							
December 31 quarter	2.00	724,382	499,273	.89	.61	.....	.....
n Year, Dec. 31	2.00	2,703,742	2,009,784	3.30	2.43	.....	.....
Hercules Powder:							
Year, Dec. 31	*w*.75	4,440,273	4,284,164	*j*3.23	*x*6.33	268,953	628,255
Parker Rust-Proof:							
Year, Dec. 31	§1.50	1,181,179	1,080,646	2.75	2.51	105,468	80,076
Sun Oil:							
n Year, Dec. 31	§1.00	9,544,085	7,563,554	4.17	3.44	.....	.....
West Virginia Pulp & Paper:							
Year, Oct. 31	*y*.70	2,862,011	.....	2.13	...	.....	.....

y Amount paid or payable in 12 months to and including the payable date of the most recent dividend announcement; *n* Preliminary report; *w* Last dividend declared; *j* On average shares; *x* Based on smaller number of shares; § Plus extras.

The divergent paths of the stock market in 1936 and 1937 are statistically shown in the table opposite.



Market value of all listed chemical stocks in billions of dollars for the years 1929-37.

In its classification of the chemical industry the statisticians of the N. Y. Stock Exchange employ a rather broad interpretation, and as of Jan. 1, 1938 included in the 59 companies in the group the following: 32 heavy chemical manufacturing companies, including paint manufacturers; 5 light chemical manufacturing companies; 4 fertilizer companies; 4 glass manufacturers; and 14 drug and cosmetic manufacturers.

The stock market showed little net change in January, a tabulation of 220 active stocks by the *N. Y. Sun* showed that their combined valuation appreciated 0.4%. A much larger gain would have been registered if the market could have held in the final 2 weeks the improvement which took place in the first half of the month. The first wave of enthusiasm over the conferences in Washington between the President and a large number of leading business executives soon spent itself.

Dividends and Dates

Name	Div.	Stock Record	Payable
Archer-Daniels-Midland, pf., q	$1.75	Jan. 21	Feb. 1
Atlantic Ref. Co., q	25c	Jan. 25	Feb. 15
Atlas Powder, pf., q	$1.25	Jan. 20	Feb. 1
Colgate-Palmolive-Peet, pf.	$1.50	Mar. 5	Apr. 1
Cook Paint & Varnish, q	15c	Feb. 18	Mar. 1
Cook Paint, $4 pf., q	$1.00	Feb. 18	Mar. 1
Dow Chemical	75c	Feb. 1	Feb. 15
Dow Chemical, pf.	1¼%	Feb. 1	Feb. 15
Freeport Sulphur, pf., q	$1.50	Jan. 13	Feb. 1
Great Western Electro-Chemical	80c	Feb. 5	Feb. 15
Hercules Powder, pf., q	1½%	Feb. 4	Feb. 15
Interchemical Corp., 6% pf.	$1.50	Jan. 25	Feb. 1
Monsanto, $4½, Class A, pf.	$2.25	May 10	June 1
National Lead, pf. A, q	$1.75	Feb. 25	Mar. 15
National Lead, pf. B	$1.50	Jan. 21	Feb. 1
N. J. Zinc Co.	50c	Feb. 19	Mar. 10
Phillips Pet. Co.	50c	Feb. 4	Mar. 1
Procter & Gamble, q	50c	Jan. 25	Feb. 15
Sherwin-Williams, q	$1	Jan. 31	Feb. 15
Smith Agr. Chem., 6% pf., q	$1.50	Jan. 21	Feb. 1
Spencer Kellogg, q	40c	Feb. 23	Mar. 10
Sun Oil Co., q	25c	Feb. 25	Mar. 15
Sun Oil Co., pf.	$1.50	Feb. 10	Mar. 1
West Va. Pulp Paper, pf.	$1.50	Feb. 1	Feb. 15
Westvaco Chlorine, q	25c	Feb. 10	Mar. 1
Will & Baumer Candle, pf.	$2	Mar. 15	Apr. 1

Chemical Finances

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Chemical Stocks and Bonds

Jan. Last	1938 High	1938 Low	1937 High	1937 Low	1936 High	1936 Low	Sales	Stocks	Par $	Shares Listed	Dividends*	Earnings** $-per share-$ 1937	1936	1935
NEW YORK STOCK EXCHANGE							Number of shares Jan. 1938	1937						
47¾	58¼	46¼	80¼	44½	86½	58	21,700	324,700	Air Reduction	No	2,579,391	$3.00	.....	2.74	2.05
158	176½	154½	258½	145	245	157	14,700	198,200	Allied Chem. & Dye	No	2,214,099	7.50	.....	11.44	8.71
57	66	57	101½	53½	89	49	2,300	64,600	Amer. Agric. Chem.	No	210,932	7.75	8.86	4.71	6.37
11½	13¾	11⅛	30¾	8¼	35⅜	20½	6,300	240,100	Amer. Com. Alcohol	20	260,930	.50	.....	4.55	3.16
27	30¼	25¾	46	22	50	37	1,400	60,000	Archer-Dan.-Midland	No	549,546	2.00	5.03	3.05	4.20
42¾	48	42½	94	38	84	48	2,100	40,900	Atlas Powder Co.	No	248,145	2.25	4.40	4.21	2.81
110	110	105	133	101	131	112	60	2,390	5% conv. cum. pfd.	100	68,597	5.00	.....	20.85	16.93
15⅛	18⅞	14	41¼	13	32¾	21¾	33,600	179,650	Celanese Corp. Amer.	No	1,000,000	2.25	.....	2.33	1.99
94	94	92	115	90	116	106	200	12,700	prior pfd.	100	164,818	7.00	.....	27.25	35.34
8⅝	11⅞	8½	25¾	8½	21¼	13	33,500	830,800	Colgate-Palm.-Peet	No	1,999,970	.50	.....	1.40	1.36
91½	95½	91½	104½	95	106½	100	2,800	18,900	6% pfd.	100	248,197	6.00	.....	17.13	16.79
65	76	65	125¾	65	136½	94	5,200	67,600	Columbian Carbon	No	537,406	6.50	.....	7.48	5.56
8	10	7⅜	21¼	5	24⅝	14¼	58,200	1,351,100	Commercial Solvents	No	2,636,878	.60	.....	.85	1.02
59¼	65½	58½	71¼	50½	82½	63⅝	14,700	332,900	Corn Products	25	2,530,000	3.00	.....	3.86	2.62
164½	164½	164	171½	153	170	158	200	10,900	7% cum. pfd.	100	245,738	7.00	.....	46.76	33.97
29½	37½	29½	76⅛	29½	63	42	1,000	20,100	Devoe & Rayn. A	No	95,000	3.25	4.05	4.49	2.89
88¾	98	87⅞	159¼	79½	142¼	94⅛	4,100	40,900	Dow Chemical	No	945,000	3.35	.....	4.42	3.29
111½	120⅝	107⅜	180⅛	98	184¾	133	76,900	560,300	DuPont de Nemours	20	11,041,437	6.25	7.29	7.54	5.04
113⅜	113⅞	111	112	107½	...	...	2,300	8,500	4½% pfd.	No	500,000	4.50	.....	.....	.....
135	135⅛	132	135½	130	136½	129	1,700	27,500	6% cum. deb.	100	1,092,948	6.00	.....	82.24	56.81
159	167	155½	198	144	185	156	11,900	161,400	Eastman Kodak	No	2,250,921	7.50	.....	8.23	6.90
160	162	157	164	150	166	152	90	3,710	6% cum.	100	61,657	6.00	.....	306.64	258.09
25¼	28	22½	32¼	18	35⅝	23½	22,200	355,500	Freeport Texas	10	796,380	1.50	3.30	2.43	1.78
8⅝	9⅞	7⅞	19	8½	18	9½	13,500	79,000	Gen. Printing Ink	1	735,960	1.20	.....	1.32	.97
21½	27¼	20¼	51½	19⅛	55¼	39½	15,400	279,800	Glidden Co.	No	800,060	2.60	.....	3.29	2.74
47	51½	46	58⅛	43	56	52¼	1,500	23,700	4½% cum. pfd.	50	199,940	2.25	.....	15.43	13.23
87	93	86¾	117½	80⅛	133	99⅝	3,000	27,500	Hazel Atlas	25	434,474	6.56	.....	6.55	7.58
52½	58	51¼	92½	50	75	42	14,600	57,900	Hercules Powder	No	1,316,710	2.62	2.97	3.24	2.12
128	130	126¾	135½	125	135	126	60	3,140	6% cum. pfd.	100	96,194	6.00	.....	50.09	36.30
18½	22	16	47¼	15	41⅜	25⅝	21,800	466,000	Industrial Rayon	No	759,325	2.00	.34	2.24	1.00
18½	25	17	64¼	20	48	37	7,700	60,400	Interchem	No	289,058	2.00	.....	3.02	2.21
90½	95	90½	111½	92	112	107	160	3,670	6% pfd.	100	66,917	6.00	.....	18.97	16.15
3	3⅞	2½	9⅛	2	5⅞	2⅞	22,900	732,800	Intern. Agricul.	No	438,048	....	.16	—1.55	—.99
22½	29	20	63½	18¼	47¼	22⅛	5,200	128,200	7% cum. pr. pfd.	100	100,000	3.00	7.70	.23	2.69
48⅜	51¾	43¼	73⅜	37	66⅜	43¼	301,400	2,920,900	Intern. Nickel	No	14,584,025	2.25	.....	2.40	1.65
20⅛	21	20	28¾	19½	30	23	700	17,900	Intern. Salt	No	240,000	1.75	.....	1.65	1.32
21	22	21	36	19¼	36¾	29¼	400	23,500	Kellogg (Spencer)	No	500,000	1.60	2.81	2.62	2.22
34	42	31½	79	33⅝	80¼	47⅛	26,900	372,300	Libbey Owens Ford	No	2,506,117	4.00	.....	4.14	3.26
18	20	17½	26⅞	14	46¼	32¼	6,300	169,900	Liquid Carbonic	No	700,000	2.75	2.37	1.58	1.29
23¾	25¾	22⅜	41¾	22	42⅜	27½	4,300	138,800	Mathieson Alkali	No	828,191	1.65	1.81	1.76	1.44
78½	91	77½	107½	71	103	79	8,900	144,500	Monsanto Chem.	No	1,114,388	3.00	.....	4.01	3.45
113	113	111	109	105	...	...	100	1,400	4½% pfd.	No	50,000	4.50	.....	.....	.....
24	29¾	21⅞	44	18	36½	26¾	23,400	547,700	National Lead	10	3,098,310	.50	.....	1.71	1.08
159	159	158½	171	153	171	155	300	6,800	7% cum. "A" pfd.	100	243,676	7.00	.....	33.83	25.40
134	136	134	150	127	147	137¾	90	2,250	6% cum. "B" pfd.	100	103,277	6.00	.....	74.50	49.05
15½	19¼	12⅝	41¾	10⅞	40	9	128,200	979,200	Newport Industries	1	519,347	.50	.....	.98	.57
52	66½	48½	103¾	51¼	82	64	35,100	208,300	Owens-Illinois Glass	12.50	2,661,204	4.00	3.50	3.80	2.09
47¾	50⅝	45⅝	65½	43¼	56	40¼	19,300	301,900	Procter & Gamble	No	6,325,087	2.75	4.08	2.39	2.23
118	118½	117	118½	114½	122¼	115⅜	1,530	6,240	5% pfd.	100	169,517	5.00	157.05	94.14	88.15
16⅛	18¼	15⅜	34¾	14⅞	28¾	14¾	15,100	579,100	Shell Union Oil	No	13,070,625	1.00	.....	1.58	.37
100	101¾	96¾	105⅜	91	127½	102	2,400	64,000	5½% cum. pfd.	100	379,798	5.00	.....	65.49	17.92
26⅛	34¾	25⅛	60⅝	26½	47⅜	19½	10,100	265,400	Skelly Oil	No	1,006,348	1.50	.....	4.42	2.17
90⅝	93	90⅝	102¼	88	132	97⅝	300	18,000	6% cum. pfd.	100	66,300	6.00	.....	73.16	39.00
32⅜	35½	32⅜	50	26½	48½	32¾	48,900	746,000	S. O. Indiana	25	15,235,323	2.30	.....	3.09	1.98
47	51⅜	44½	76	42	70⅜	51⅛	119,800	2,068,100	S. O. New Jersey	25	26,224,767	2.50	.....	3.73	2.39
6¼	8	6	15⅜	5¼	13	5⅝	14,600	596,900	Tenn. Corp.	5	853,696	.35	.....	.41	.22
38½	44⅞	37¼	65⅛	34¾	55¼	28⅞	137,400	2,875,000	Texas Corp.	25	10,873,559	2.25	.....	4.10	1.57
30¼	34	27	44	23¾	44¾	33	22,700	883,800	Texas Gulf Sulphur	No	3,840,000	2.75	.....	2.57	1.94
71¼	78¼	69¾	111	61¼	105¼	71⅝	67,600	834,400	Union Carbide & Carbon	No	9,000,743	3.20	.....	4.09	3.06
41	46¼	39	91	36¾	96¾	68	13,600	111,400	United Carbon	No	397,885	4.50	.....	5.54	4.71
19½	23¾	19⅛	43⅝	16⅛	59	31¼	15,700	436,800	U. S. Indus. Alc.	No	391,238	.....	.....	—.20	2.16
17	20⅜	15	39⅜	9⅛	30⅝	16¼	51,800	791,800	Vanadian Corp. Amer.	No	376,637	1.00	.....	.40	—1.13
4½	5⅝	3½	12¾	2⅜	8½	4⅜	53,600	931,700	Virginia-Caro. Chem.	No	486,708	.....	—.05	—2.44	—.79
26	32⅛	22¾	74⅜	18½	58¾	28¾	27,900	311,900	6% cum. part. pfd.	100	213,392	1.50	5.88	.44	4.20
13	15½	12	27¼	10¾	32	19¼	3,700	68,800	Westvaco Chlorine	No	339,362	1.00	.....	1.17	1.37
25½	26¾	24	34⅞	21¼	35¼	31¾	1,500	34,300	cum. pfd.	30	192,000	1.50	.....	3.26	3.22
NEW YORK CURB EXCHANGE															
24	26½	23	37	17⅝	40¾	29¼	28,700	685,900	Amer. Cyanamid "B"	10	2,454,425	.60	.....	1.77	1.61
...	...	...	2⅞	1	3¾	2⅛	.....	20,900	British Celanese Am. R.	10/	4,222,667	....	.....	—4.53%	—.71
68	82	68	124	69	116¼	99¼	200	14,300	Celanese, 7% cum. 1st pfd.	100	148,179	7.00	.....	23.90	21.96
3¼	4⅛	3¼	15	3	16½	9	500	17,000	Celluloid Corp.	15	194,951	....	.....	—.80	—.95
12	12	12	14⅝	10½	15	11⅞	100	9,700	Courtaulds' Ltd.	£1	24,000,000	9½%	.....	8.40%	7.51%
9⅝	9⅝	7⅞	10⅝	3½	10¾	5	2,700	74,600	Duval Texas Sulphur	No	500,000	....	.....	.61	.16
35	37	35	47½	31	55	39	300	15,700	Heyden Chem. Corp.	100	150,000	2.50	.....	3.56	3.22
82	90	82	147½	77	140	98¼	7,900	90,700	Pittsburgh Plate Glass	25	2,142,443	6.50	.....	7.15	5.32
87¾	90	81	154¾	72¼	154½	117	5,500	71,950	Sherwin Williams	25	633,927	6.00	8.44	8.04	6.19
107	110	107	114	106¼	116	110	260	3,630	5% cum. pfd.	100	137,139	5.00	44.01	41.44	33.17
PHILADELPHIA STOCK EXCHANGE															
146	149½	140½	179	115	179	114¾	575	8,650	Pennsylvania Salt	50	150,000	8.75	11.79	8.57	5.94

Jan. Last	1938 High	1938 Low	1937 High	1937 Low	1936 High	1936 Low	Sales	Bonds	Date Due	Int. %	Int. Period	Outstanding $
NEW YORK STOCK EXCHANGE							Jan. 1938	1937				
104	104¼	103	109½	99	117½	107¾	228,000	4,683,000	Amer. I. G. Chem. Conv. 5½'s	1949	5½ M-N	$25,300,000
29	31	29	42½	23	42½	27½	553,000	2,507,000	Anglo Chilean Nitrate inc. deb.	1967	4½-5 J	12,067,000
103½	104	102¾	102⅞	100⅛	...	...	45,000	288,000	Dow Chemical	1951	3 J-D	5,000,000
100	100½	100	102	98½	102¾	96¾	45,000	446,000	Int. Agric. Corp. 1st Coll. tr. stpd. to 1942	1942	5 M-N	5,633,000
29⅝	32⅜	29	35⅜	21¼	39	21	181,000	2,681,000	Lautaro Nitrate n inc. deb.	1975	4 J-D	30,500,000
20½	21⅛	20½	25½	20½	35	23½	6,000	37,000	Ruhr Chem. 6's	1948	6 A-D	1,500,000
98¼	100⅝	97¾	102	93	101¾	94¼	592,000	8,241,000	Shell Union Oil	1951	3½ M-S	58,800,000
98⅜	99½	97	102¾	94	102⅞	96⅝	198,000	2,255,100	Skelly Oil	1951	4 J-J	9,000,000
98	98	96	105	93½	105	103	22,000	342,000	Tenn. Corp. deb. 6's "B"	1944	6 M-S	1,600,000
104⅞	106¼	104½	105¾	100	106	101½	410,000	7,696,000	Texas Corp.	1951	3½ J-D	60,000,000
84	86	81	111	81	98½	85¾	103,000	1,778,000	Vanadium Corp. conv. 5's	1941	5 A-O	2,800,000

* Paid in 1937, including extras but excluding dividends paid in stock. ** For either fiscal or calendar years.

1937 FERTILIZER TAX TAG SALES FOR 17 STATES BY MONTHS AND TOTALS FOR JANUARY-DECEMBER PERIODS 1937, 1936, 1935*

(Short Tons)

	January	February	March	April	May	June	July	August	September	October	November	December	Yearly Totals — % of 1936	1937	1936	1935
South:																
Virginia†	40,202	56,345	94,603	103,285	19,300	9,125	6,541	11,519	47,513	27,758	7,627	6,362	114	440,430	386,474	378,536
North Carolina	111,323	141,676	383,661	376,904	56,437	30,484	7,625	3,175	16,350	18,429	7,402	6,165	119	1,236,564	1,038,920	1,000,071
South Carolina	64,313	136,805	360,420	114,584	31,939	19,515	3,570	1,300	6,700	9,722	8,020	14,310	123	771,198	626,446	613,561
Georgia	47,136	148,966	415,043	175,309	35,309	13,152	2,824	750	845	3,190	3,791	13,245	127	866,360	684,522	617,439
Florida†**	69,203	58,570	52,724	42,704	58,499	20,326	25,133	16,878	32,240	49,070	86,332	67,720	113	579,399	512,577	418,239
Alabama	26,450	85,400	206,050	262,950	26,200	9,850	210	550	1,600	1,400	250	8,350	135	629,260	467,700	422,400
Mississippi	32,187	26,823	119,383	131,951	1,205	10,545	491	1,200	464	.....	210	861	136	325,320	239,027	214,015
Tennessee†	2,300	14,776	28,472	53,000	17,120	650	4,886	1,908	8,940	6,013	3,234	.....	120	141,325	117,305	96,444
Arkansas‡	44	16,650	17,905	49,995	2,750	.....	6,000	250	1,100	100	3,500	500	140	68,675	48,931	39,630
Louisiana†	11,645	36,822	52,460	25,895	4,100	850	500	1,580	9,626	8,600	3,590	1,650	134	157,318	117,106	92,532
Texas†	9,235	20,835	21,415	19,638	2,488	300	436	630	8,525	2,200	1,912	1,785	136	89,400	65,549	61,802
Oklahoma	1,700	2,105	685	460	155	5	10	505	1,115	105	.....	.....	113	6,845	6,055	6,619
Total South 1937	415,738	745,773	1,752,821	1,356,675	255,502	114,802	58,226	40,245	135,018	126,587	122,888	184,948	123	5,312,094	4,310,612	3,961,288
Total South 1936	**341,793**	**546,724**	**1,398,273**	**1,024,261**	**249,386**	**84,315**	**44,300**	**60,622**	**145,822**	**137,441**	**99,697**	**177,978**				
Total South 1935	**321,130**	**699,794**	**1,414,925**	**704,348**	**236,766**	**65,829**	**17,267**	**44,475**	**94,808**	**151,270**	**85,632**	**123,807**				
Midwest:																
Indiana	7,125	13,762	58,943	29,098	26,875	281	8,181	91,350	36,913	1,688	331	813	108	275,088	254,118	119,946
Illinois	4,175	.....	19,097	4,956	6,218	412	375	3,363	3,931	4,125	.....	1,112	137	47,764	34,895	25,151
Kentucky	2,763	25,388	15,450	33,195	10,788	313	705	10,783	9,150	8,543	.....	.....	131	117,078	89,392	73,502
Missouri	2,536	2,626	24,052	2,142	154	19	590	12,659	31,900	5,586	240	58	88	82,498	93,588	59,398
Kansas	45	255	1,465	165	5	.....	50	3,819	9,063	384	6	10	137	15,267	11,170	7,298
Total Midwest 1937	16,644	42,031	119,007	69,546	44,040	1,025	9,901	121,974	90,957	20,326	577	1,993	111	537,695	483,163	360,295
Total Midwest 1936	**19,399**	**26,121**	**71,687**	**48,410**	**56,954**	**1,432**	**14,534**	**95,383**	**112,047**	**32,991**	**219**	**226**				
Total Midwest 1935	**9,995**	**48,466**	**61,939**	**40,050**	**26,062**	**3,647**	**7,066**	**61,662**	**75,420**	**25,512**	**747**	**134**				
Grand Total 1937	432,382	787,804	1,871,828	1,426,221	299,542	115,827	68,127	162,219	225,975	146,913	123,465	186,941	122	5,849,789	4,793,775	4,321,583
Grand Total 1936	**361,192**	**572,845**	**1,469,960**	**1,072,671**	**306,340**	**85,747**	**58,834**	**156,005**	**257,869**	**170,432**	**99,916**	**178,204**				
Grand Total 1935	**331,125**	**748,260**	**1,476,864**	**744,398**	**262,828**	**69,476**	**24,333**	**106,137**	**170,228**	**176,782**	**86,379**	**123,941**				

* Monthly records of fertilizer tax tags are kept by state control officials and may be slightly larger or smaller than the actual sales of fertilizer. The figures indicate the equivalent number of short tons of fertilizer represented by the tax tags purchased and required by law to be attached to each bag of fertilizer sold in the various states; † Cottonseed meal sold as fertilizer included; ‡ Excludes 61,300 tons of cottonseed meal for January-December combined, but no separation is available for the amount of meal used as fertilizer from that used as feed; ** Includes 65,900 tons of phosphatic and lime materials for January-December. Figures compiled from Nat. Fert. Assoc. Reports.

U. S. FERTILIZER CONSUMPTION

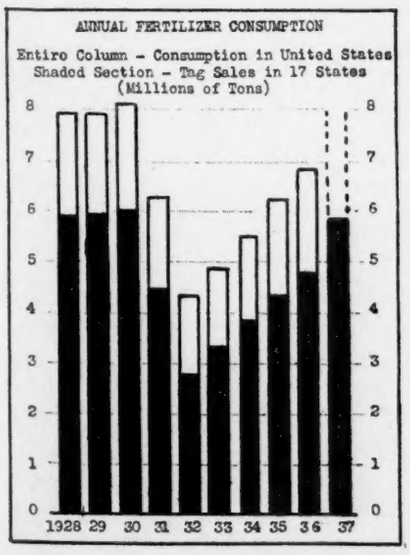
1928	7,985,019
1929	7,974,712
1930	8,163,257
1931	6,306,083
1932	4,335,607
1933	4,871,271
1934	5,547,520
1935	6,220,831
1936	6,820,193
1937	8,100,000*

* Preliminary.

'37 Tax Tag Sales

Fertilizer consumption in 1937 as indicated by tax tag sales totaled 5,849,789 tons in 17 reporting states. This was largest tonnage in any year since '30, exceeding '36 by 22%. Sales in all of the 12 Southern States in '37 were well above '36, with increases ranging from 13% in Oklahoma to 40% in Arkansas. Four of the Midwestern States reported increases in '37 over '36, more than offsetting decline in Missouri and resulting in an 11% increase for region as a whole.

In '36 tag sales in 17 states accounted for 70.4% of total fertilizer consumption in the U. S. Applying this ratio to the '37 tag sale figure would give an estimate of 1937 total consumption of more than 8,350,000 tons. This is undoubtedly too high, although likely in excess of 8 million tons. In the decline from '30 to '32 consumption in the South declined more rapidly than in the rest of the country and in subsequent years it has been increasing more rapidly, accounting for a larger proportion of the national total each year since 1932. Consumption in the Northeast is relatively stable and fluctuates less than in the South. Soil Conservation Program probably stimulated fertilizer



Fertilizer Consumption
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Fertilizer Consumption

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use in some sections last year and tonnage in California continued to rise, so likely the South's proportion of total consumption, although higher than in depression years, was still less than in 1928-30.

TAX TAG SALES, BASED ON 1928-30 AVERAGE AS 100

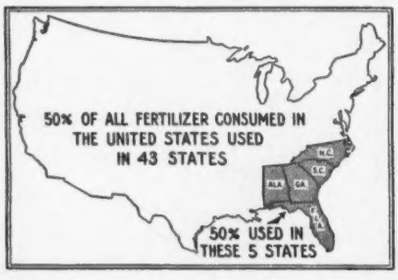
	'28-'30	'31	'32	'33	'34	'35	'36	'37
South	100	74	48	57	65	72	78	97
Midwest ..	100	78	40	46	64	79	106	118

As shown by the above table, Midwest sales in past 2 years were above the '28-'30 level while in the South they were only 3% less. For the country as a whole they were approximately the same as in '28-'30.

Fertilizer tax tag sales sharply increased January-April, being the largest tonnages since '30. Upward trend halted in May, volume being slightly less than in the corresponding month of '36. In view, however, of large spring season and that May sales ordinarily account for only about 6% of the year's total this slight decline was without special significance. June again saw a gain. At the end of the fiscal year (June 30) sales were ahead 29%, respective tonnages being 5,315,485 and 4,163,248. July sales were highly encouraging, although percentage of sales in this month is extremely small. Beginning with August sales began to drop below '36 level, but November again showed a gain and December did likewise.

Particularly outstanding were gains made in Georgia, '37 total of 866,360 tons comparing favorably with 684,522 in the previous year; in South Carolina, 771,198 against 626,446, constituted best year since '28. Tonnage in Florida, 579,399 tons, exceeded '36 figure which was a new high record. Sales in Indiana made a sharp recovery.

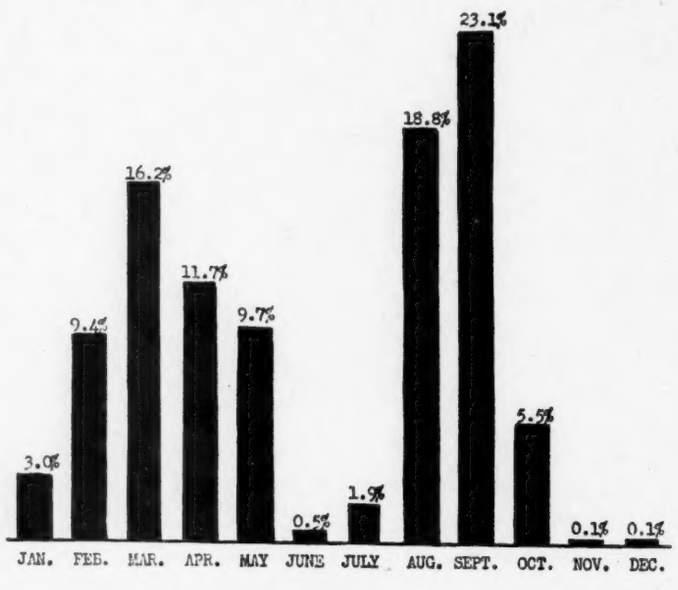
High hopes of the fertilizer industry during the first 8 months were somewhat blasted by the sagging of farm commodity prices in the last 4 months when it became apparent that record crops, particularly in cotton, were inevitable. This, of course, had very little actual effect on '37 tonnages, except in the midwest states, where normal tonnages are heavy in August and September, but it did change the future outlook.



PERCENTAGE OF FERTILIZER TAX TAGS SOLD EACH MONTH IN THE FIVE MIDWESTERN STATES

BASED ON THE YEARS 1934, 1935, and 1936

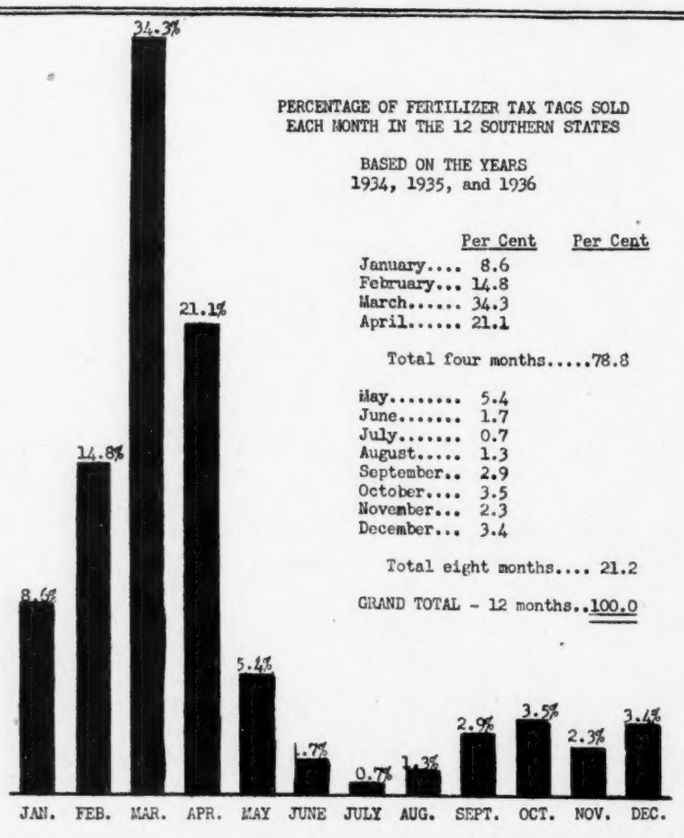
	Per Cent		Per Cent		Per Cent
January....	3.0	May.....	9.7	September..	23.1
February...	9.4	June.....	0.5	October....	5.5
March.....	16.2	July.....	1.9	November...	0.1
April.....	11.7	August.....	18.8	December...	0.1
Total four months	40.3			Total eight months	59.7



PERCENTAGE OF FERTILIZER TAX TAGS SOLD EACH MONTH IN THE 12 SOUTHERN STATES

BASED ON THE YEARS 1934, 1935, and 1936

	Per Cent	Per Cent
January....	8.6	
February...	14.8	
March.....	34.3	
April.....	21.1	
Total four months.....		78.8
May.....	5.4	
June.....	1.7	
July.....	0.7	
August.....	1.3	
September..	2.9	
October....	3.5	
November...	2.3	
December...	3.4	
Total eight months....		21.2
GRAND TOTAL - 12 months..		100.0



To be Continued March Issue

PRICE COMPARISONS

	Price Jan. 1, '37	High for 1937	Price Dec. 31, '37
Copper (metal) ..	12c	17c	11c
Copper sulfate ...	$4.55	$6.00	$4.50
Lead (metal), N. Y.	$6.00	$6.15	$4.75
Red Lead, 95% ...	8½c	9.45c	7¼c
97%	8¾c	9¾c	7½c
98%	9c	10c	7¾c
White lead	7¼c	9c	6¾c
Basic Lead Sulfate	6½c	8¾c	6¼c
Zinc (metal), E. St. L.	$5.45	$7.50	$5.00
Zinc oxide	5c	6.45c	6c

Copper

U. S. copper industry improved in '37 as a whole in production, deliveries and price, according to the Bureau of Mines. Following record-breaking demand, falling stocks and rapidly advancing prices late in '36 and early in '37, production rate was advanced sharply. Domestic production overtook domestic deliveries in May and from then until the end of the year producers' stocks of refined copper increased monthly, with the promise of a continuance of this trend into '38. Declining industrial rate in late months of the year was accompanied by a marked constriction in demand and with rising stocks and falling prices led producers to curtail production. Results of curtailment efforts began to be evident in monthly figures for the final quarter. Data covering consumers' stocks are not available, but it is likely that they fell during the year.

Annual figures for '37 show following results: smelter production from domestic ores increased 38% over '36, refinery new production from domestic sources was 25% higher and that from foreign sources was 41% higher than in '36, reflecting increased importation of crude copper materials. Imports of unmanufactured copper were probably over 40% above those in '36 while exports were less than 30% higher. Quantity increases for both imports and exports, however, were very close so that net exports in '37 were little different from '36. Apparent consumption of new copper was 8% above previous year. Stocks of refined copper at refineries increased 48% in '37 and those of blister copper at smelters, in transit to refineries and of unfinished materials at refineries gained only 19% so that total inventories of refined and unrefined copper were 29% larger at the end of '37 than at the end of '36.

At the beginning of '37 price for copper was moving rapidly upward. Sharp upward trend continued through March but came to an abrupt end in April, falling 3c a lb. in that month from a high of 17c on April 1. Average quoted monthly price for electrolytic copper f.o.b., refinery for January was 12.55c a lb., rose to 15.87c in

COPPER STOCKS, PRODUCTION AND CONSUMPTION

(Net Tons)

1936	Refined Stocks	Production			Ref'd Prod.	Deliveries	Invoices
		Mine	Scrap	Total			
DOMESTIC							
January	230,900	43,800	13,500	57,200	56,000	54,400	59,000
February	230,300	41,200	11,100	52,300	54,500	51,400	41,300
March	238,600	46,500	11,000	57,500	67,000	56,500	49,300
April	233,800	48,700	12,800	61,500	58,800	59,700	50,750
May	230,200	41,300	20,800	62,100	59,400	59,900	65,900
June	228,800	42,900	13,275	56,200	60,560	57,150	58,500
July	218,700	39,200	11,075	50,280	53,985	59,800	69,950
August	205,740	43,195	8,695	51,960	55,410	64,140	67,800
September	188,720	58,340	8,502	66,842	62,660	75,890	60,600
October	178,018	62,600	9,590	72,190	72,895	75,919	77,446
November	171,290	63,500	10,470	73,970	68,680	67,370	65,521
December	161,070	60,400	9,250	69,650	78,850	82,400	75,915
Totals		591,635	140,057	731,692	748,740	764,569	
1937							
January	142,370	62,250	12,910	75,160	68,100	80,810	86,791
February	136,120	62,739	9,284	72,023	71,230	74,610	69,809
March	121,448	69,638	21,480	91,117	83,676	94,830	87,974
April	99,576	67,244	27,336	94,580	83,178	95,884	88,423
May	108,585	72,580	15,074	87,655	95,265	81,336	71,401
June	111,020	73,914	15,796	89,710	86,016	77,725	73,575
July	117,741	73,657	11,912	85,569	79,611	67,356	58,226
August	126,180	77,440	13,780	91,220	82,835	68,010	68,063
September	144,320	68,870	14,936	83,806	90,980	66,230	66,371
October	181,842	71,383	9,415	80,798	86,811	44,592	49,866
November	221,676	59,707	9,739	69,446	75,791	33,892	42,246
December	259,908	52,606	8,727	61,333	60,463	18,103	46,772
Totals ...		812,028	170,389	982,417	963,956	803,378	
WORLD							
1936							
January	488,000	111,400	23,000	134,400	133,100	134,500	131,300
February	481,300	108,300	22,500	130,800	131,500	138,100	123,800
March	483,300	117,000	19,500	136,500	139,000	137,000	124,000
April	472,200	117,550	18,300	135,900	130,000	141,150	122,000
May	466,100	110,650	32,200	142,850	131,560	137,650	138,600
June	458,900	109,275	21,825	131,100	134,970	142,290	137,900
July	432,320	104,200	18,120	122,320	119,450	146,040	150,675
August	405,580	113,510	17,300	130,810	128,630	155,380	155,930
September	379,986	124,975	15,745	140,720	134,334	159,873	139,593
October	357,000	136,781	17,559	154,340	149,222	172,423	166,387
November	353,036	148,790	20,680	169,470	160,460	164,440	156,971
December	353,300	148,950	22,150	171,100	162,980	161,700	159,421
Totals ...		1,451,381	248,879	1,700,310	1,655,186	1,790,546	
1937							
January	336,050	160,970	21,580	182,550	164,950	182,220	172,772
February	328,170	162,808	22,735	185,543	172,249	180,177	163,593
March	308,430	175,778	28,605	204,383	191,004	210,742	190,847
April	283,363	177,834	37,427	215,261	191,809	216,877	202,277
May	291,448	184,642	23,347	207,989	204,140	196,055	178,238
June	300,445	181,547	26,363	207,910	199,999	191,002	186,415
July	313,115	166,464	23,810	190,274	193,271	180,601	168,179
August	331,310	173,540	25,170	198,710	188,380	170,180	178,101
September	344,730	168,750	28,197	196,977	197,320	183,900	183,780
October	383,164	175,141	21,857	196,998	196,359	158,783	165,051
November	413,846	159,099	19,131	178,230	185,270	154,588	166,413
December	471,752	144,502	21,682	166,184	179,872	121,966	155,736
Totals		2,031,075	299,904	2,331,009	2,264,623	2,147,091	

SLAB ZINC DATA

(Tons of 2,000 Lbs.—Compiled by American Zinc Institute)

1936	Production	Shipments	Stocks	Unfilled Orders	Daily Aver. Prod.
January	41,917	46,468	79,207	42,219	1,349
February	36,228	39,918	75,517	56,829	1,249
March	42,483	38,159	79,841	41,638	1,370
April	43,252	42,311	80,782	35,968	1,442
May	44,905	43,977	81,710	28,370	1,449
June	44,947	41,654	85,003	27,090	1,498
July	45,553	41,891	88,665	44,458	1,469
August	43,614	46,085	86,194	65,173	1,407
September	42,283	51,847	76,630	54,064	1,409
October	46,297	54,035	68,892	60,513	1,493
November	45,742	57,107	57,527	75,891	1,525
December	47,050	59,821	44,756	78,626	1,518
Totals	524,271	563,273			
1937					
January	40,047	51,227	33,775	76,544	1,292
February	37,794	46,953	24,616	77,969	1,350
March	53,202	59,635	18,183	89,846	1,716
April	51,957	56,229	13,911	81,448	1,734
May	55,012	55,201	13,774	67,143	1,775
June	50,526	50,219	14,081	59,209	1,684
July	49,181	49,701	13,561	82,596	1,586
August	48,309	50,643	11,227	106,187	1,558
September	50,027	47,737	13,517	92,319	1,668
October	52,645	40,345	25,817	75,086	1,698
November	49,393	32,676	42,534	61,151	1,646
December	51,787	29,545	64,776	48,339	1,671
Totals	589,880	570,111			

Non-ferrous Metals

Copper, Lead, Zinc, 1937—p. 2

March and then declined steadily to 10.11c in December, lowest monthly average for the year. Trend in '37 marked a reversal of that in '36 when the price was 9.12c in January and advanced steadily as the year progressed to 10.89c in December, highest monthly average for the year.

Prices for most of the copper salts in '37 did follow the general upward trend of the metal in the first quarter and sympathetically declined when quotations of copper declined. Copper chemicals were naturally influenced in the first quarter of '37 when the metal soared because of inadequate production, fear of higher costs in this country due to wage increases, burdensome taxes and labor disturbances, plus the speculation attending the announcement of the huge British armament program. Copper sulfate, particularly, was advanced rapidly to a high of $6.00 per hundred lbs. (C. I., March, '37, p. 307; also April, '37, p. 413). Speculation took place, stocks became scarce, but when the metal started to slide considerable reselling in blue vitriol took place. It is of more than passing interest, however, that the demand for copper sulfate was so large throughout '37 that stocks in the hands of actual manufacturers dropped close to the vanishing point and they at times were hard put to make deliveries against contracts.

Zinc

In '37 the zinc industry enjoyed its 5th consecutive year of advancement from depression lows, as indicated by figures of output, apparent consumption and price, but much of the rapid gain made in the early months of the year was erased by the severe decline in the final quarter, according to the Bureau of Mines. Shipments exceeded production for the first 8 months and by the end of August stocks had fallen to only one-fourth of the total on hand at the beginning of the year. The tight situation resulting therefrom was reflected immediately in sharp increases in domestic quotations and by June parity with London prices had been overcome and importation became profitable. From July to November large quantities of zinc were imported, total for the year being the highest on record and more than 3 times that of '36. Sharp drop in demand in the final quarter combined with the heavy importation of metal resulted in rising stocks that at the end of November were little different from those on January 1. Prices also moved downward and at the close of the year were considerably lower than at the beginning.

Average monthly quoted price for prime western zinc at St. Louis was 5.86c a lb. in January and rose to 7.38c in March, continuing the advances of '36. After receding in the next few months it advanced to 7.18c a lb. in September, second highest monthly average for the year. Price broke sharply in the last quarter and was 5c a lb. as the year closed. Average for the year was 6.50c, compared with 4.90c in '36 and 4.33c in '35. In June, '37, price differential between zinc sold in St. Louis and London markets was more than 2c a lb. or large enough to make importations of zinc attractive, and the advantage to foreign zinc continued for several months. As a result, during that period imports of slab zinc into the U. S. were very large.

Fluctuations in the zinc pigments do not generally follow the market trend of zinc as closely as is the case with certain of the other metallic compounds, notably the lead pigments and many of the copper salts. Because of this the rise in lead pigments in the first quarter of '37 was not paralleled by swift rises in zinc oxides. Advances in zinc oxides came in June and again in September and were explained by the fact that while demand and consumption had fallen off somewhat from the earlier peak, the statistical position of the metal was still highly favorable (C. I., July, '37, p. 84; also Oct., '37, p. 404). A reaction set in in October and carried through the final quarter. Zinc oxides, however, unlike the lead pigments, were still higher priced on Dec. 31, 1937, than they were on Jan. 1, 1937.

Lead

The lead industry was likewise characterized by continued improvement over recent years in regard to production, consumption, price and stocks. Improvement was concentrated as with copper and zinc in the early part of the year, however, for in the final quarter shipments and prices fell sharply and stocks of refined lead resumed an upward trend for the first time since June, '36. Refined lead produced from domestic ores in '37 was 12% above the output for '36 and from foreign ores was more than double that of the previous year. Apparent consumption of new lead in '37 was 16% greater than in '36. Average quoted price for lead was 28% higher than in '36, but when the year closed it was 21% below the opening quotation for '37. Imports of pig lead were considerably higher than in '36 but total amounted to only 1% of the domestic output of refined lead. Exports for the year probably showed a small advance over those for '36.

The lead pigments generally are very closely attuned to price fluctuations in the metal and, in contrast to the situation in the recent contract period, the markets for red lead, white lead, etc., in late December of '36 and January of '37 advanced sharply (C. I., Jan. '37, p. 82; also March, '37, p. 309; also April, '37, p. 417). Collapse in metal prices which started early in April precipitated the downward trend in prices for lead pigments which continued almost uninterruptedly through the remainder of the year and brought quotations at the year-end to the low point for the 12-month period (May, '37, p. 528). One flurry of advancing prices, however, took place in August (C. I., Sept., '37, p. 288), but was short lived (C. I., Oct., '37, p. 404; also C. I., Nov., '37, p. 516).

(Continued in March Issue)

LEAD PRODUCTION, SHIPMENTS AND STOCKS

(Tons 2,000 Lbs.—Reported by American Bureau of Metal Statistics)

	Production						
1936	Dom. Ore	Secondary & Foreign Ore	Total Output	Daily Rate	Total Supply	Shipments	Stocks at End
January	34,088	2,208	36,296	1,171	258,602	34,590	224,013
February	32,221	1,906	34,127	1,177	258,140	33,086	225,010
March	32,184	2,966	35,150	1,134	260,160	36,743	223,388
April	36,175	1,898	38,073	1,269	261,461	40,457	220,991
May	39.558	1,993	41,551	1,340	262,542	33,125	229,409
June	36,756	2,062	38,818	1,294	268,227	37,736	230,481
July	36,863	2,713	39,576	1,277	270.057	38,996	231,081
August	31,117	2,425	33,542	1,082	264,623	46,388	218,233
September	29,788	3,194	32,982	1,099	251,215	50,685	200,517
October	39,317	2,839	42.156	1,359	242,673	59,210	183,430
November	40,273	3,558	43,831	1,454	227,261	50,313	176,960
December	43,613	2,413	46,904	1,519	223,864	52,032	171,856
Totals	**431,953**	**30,175**	**463,006**			**513,361**	
1937							
January	41,223	3,291	43,636	1,407	215,492	45,718	169,776
February	34,986	2,465	37,451	1,337	207,227	50,375	156,832
March	41,246	2,396	43,818	1,408	200,474	63,425	137,028
April	43,908	2,560	46,468	1,549	183,072	55,200	128,462
May	40,192	2,413	42,605	1,374	171,067	55,212	115,843
June	37,321	2,835	40,156	1,339	155,999	42,710	113,370
July	42,480	3,016	45,496	1,467	158.866	47,727	111,103
August	42,460	4,505	46,965	1,515	158,068	54,551	103,518
September	37,989	3,057	41,046	1,368	144,564	53,850	90,742
October	45,112	4,085	49,197	1,587	139,939	39,292	100,646
November	42,892	3,904	46,796	1,560	147,442	33,853	113,573
December	47,423	2,158	49,581	1,600	163,154	34,020	129,131
Totals	**497,232**	**36,585**	**533,215**			**575,933**	

Official Chemical Specifications

In force as of Jan. 1938—p. 3

PRODUCT	A. S. T. M.	A. S. A.	U. S. Federal	U. S. War		U. S. Navy	N. Y. City
Lime—*continued*							
Quicklime and hydrated lime for cooking rags for mfg. paper	C45-25	.....	.....	.....	..	.....	.....
Quicklime and hydrated lime for textile industry	C48-24	.....	.....	.....	..	.....	.....
Hydrated lime for mfg. varnish	C47-27	.....	.....	.....	..	.....	.....
Litharge, dry	.....	.....	.....	.....	..	52L-10a	.....
Lithopone	D208-26	.....	.....	.....	..	.....	.....
Magnesite, dead-burned	.....	.....	.....	.....	..	51M3	.....
Magnesium Oxide, light	.....	.....	.....	4-503-260A	C	.....	.....
Silicate (pigment)	.....	.....	.....	.....	..	52M2a	.....
Manganese, Ore	.....	.....	QQ-M-71	QQ-M-71	..	.....	.....
Linoleate	.....	.....	.....	.....	..	52L11	.....
Resinate (precipitated)	.....	.....	.....	.....	..	52R8	.....
Mercuric Oxide	D284-33	.....	.....	.....	..	52M1a	.....
Mercury	.....	.....	.....	50-11-36	O	51M1a	.....
Fulminate	.....	.....	.....	50-13-6	O	.....	.....
Metallic	.....	.....	.....	57-9	O	.....	.....
Methyl Acetate (for aircraft dope)	.....	.....	.....	4-20	A	.....	.....
Butyl Ketone, 90-95% grade	.....	.....	.....	4-1048	A	.....	.....
Ethyl Ketone (for aircraft dope)	.....	.....	.....	4-19A	A	.....	.....
Mono-Methyl-Paraminophenol Sulfate	.....	.....	O-M-571	O-M-571	..	O-M-571	.....
Naphtha, coal-tar	.....	.....	.....	4-1040	A	52N1	.....
Naphthalene; balls and flakes	.....	.....	R-N-91	R-N-91	..	R-N-91	.....
Nitrocellulose	D301-33	.....	.....	50-14-3	O	.....	.....
(for airplane dope)	.....	.....	.....	3-155	A	.....	.....
Long fiber, nitrogen 13%	.....	.....	.....	50-14-2	O	.....	.....
Nitrogen, compressed for recoil mechanism	.....	.....	.....	51-89-1B	O	.....	.....
Nitroglycerin	.....	.....	.....	50-13-7	O	.....	.....
Ocher, dry, paste-in-japan, paste-in-oil	D85-27	.....	TT-O-111	TT-O-111	..	TT-O-111	31-Y-2
Oil, bean, soya	.....	.....	.....	3-24A	Q	52O10	.....
Castor	.....	.....	.....	2-8A	..	14O6C	.....
Lard	.....	.....	C-O-376	C-O-376	..	C-O-376	.....
Lavender	.....	.....	.....	42.2-42	E	.....	.....
Linseed, boiled	D260-33	.....	JJJ-O-331	JJJ-O-331	..	JJJ-O-331	31-O-3:36T
Linseed, raw	D234-28	.....	JJJ-O-336	JJJ-O-336	..	JJJ-O-336	31-O-3:36T
Menhaden	.....	.....	.....	3-23B	Q	.....	.....
Mineral, light-colored (for cordage oils)	.....	.....	.....	.....	..	14O8C	.....
Neatsfoot	.....	.....	.....	2-66A	Q	14O3b	.....
Olive (edible grade)	.....	.....	Z-O-351	Z-O-351	..	.....	.....
Pine	.....	.....	.....	.....	..	52O12	.....
Pine Tar	.....	.....	.....	3-27A	Q	.....	.....
Rosin	.....	.....	.....	4-503-285	C	.....	.....
Sperm	.....	.....	.....	2-45A	Q	14O5a	.....
Tung (Chinawood) raw	D12-33	.....	.....	3-22B	Q	52O16	.....
Oxide, Lead, Litharge (ingredient primers)	.....	.....	.....	50-11-28	O	.....	.....
Paraffin Wax	D87-22	Z11 4-1928	.....	2-63B	Q	14P2	.....
Chlorinated	.....	.....	.....	4-503-127	C	.....	.....
Para Nitraniline Red	D264-28	K31-1937	.....	.....	..	.....	.....
Paris Green	.....	.....	.....	.....	..	52G7	5-I-4:37T
Petrolatum	D127-30	.....	.....	2-67	O	14P1C	.....
Phenol	.....	.....	.....	4-1028	O	.....	10-P-5
Phosphorus, red, commercial	.....	.....	.....	4-503-300	C	.....	.....
White, commercial	.....	.....	.....	4-503-305	C	.....	.....
Pigment vermilion, para red	.....	.....	.....	3-36C	Q	.....	.....
Pitch, Burgundy	.....	.....	.....	50-11-73	O	.....	.....
Coal-Tar (roofing, water-proof., etc.)	.....	.....	R-P-381	R-P-381	..	.....	.....
Plaster, Gypsum	.....	.....	SS-P-401	.....	..	SS-P-401	.....
Potash, Caustic; Potash, crude; Carbonate	.....	.....	.....	.....	..	51P7	.....
Potassium Bromide	.....	.....	.....	75-11	S	.....	.....
Chlorate (for ammunition)	.....	.....	.....	50-11-11B	O	.....	.....
Nitrate (for black pwdr.)	.....	.....	.....	50-11-26A	O	.....	.....
Permanganate	.....	.....	.....	4-503-320	C	.....	.....
Prussian Blue, dry, paste-in-japan	D261-28	K29-1937	TT-P-691	TT-P-691	..	.....	31-B-2
Pumice, powdered, lithographers	.....	.....	.....	42-5	Q	.....	.....
Reagents, Chemical (adopted by A.C.S.)	.....	.....	.....	4-1052	M	.....	10-R-3:36T
Chemical (non-A.C.S.)	.....	.....	.....	.....	..	.....	10-R-4:36T
Red, Lead, dry and paste-in-oil	D83-31	K24-1937	TT-R-191	TT-R-191	..	TT-R-191	31-L-2:36T
Toluidine, dry	.....	.....	.....	.....	..	52T6a	.....
Tuscan	.....	.....	.....	.....	..	.....	31-R-4
Venetian, dry	.....	.....	.....	.....	..	52R4d	31-R-2
Rosin	.....	.....	.....	3-45A	Q	52R5C	10-R-2
Salt, Rock	.....	.....	.....	24-18	Q	.....	.....
Salts, Nickel	.....	.....	O-S-61	O-S-61	..	O-S-61	.....
Shellac (method of sampling, testing)	D29-33	.....	.....	.....	..	.....	.....
Dry Bleached	D207-35	.....	.....	.....	..	.....	.....
Orange	D237-33	.....	TT-S-271	TT-S-271	..	TT-S-271	.....
Orange, refined	.....	.....	.....	50-11-17A	O	.....	.....
Sienna, raw and burnt	.....	.....	.....	.....	..	52S4C	31-S-1
Silica, pulverized	.....	.....	.....	.....	..	52S5C	.....
Gel	.....	.....	.....	4-503-333	C	.....	.....
Silicon, refined	.....	.....	.....	57-25	O	.....	.....
Soda Ash	.....	.....	O-S-571	O-S-571	..	O-S-571	.....

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PRODUCT	A. S. T. M.	A. S. A.	U. S. Federal	U. S. War		U. S. Navy	N. Y. City
Soda Ash (*continued*)							
Caustic (lye) for cleaning purposes	.....	.....	P-S-631	P-S-631	..	P-S-631	.....
Caustic (hydrogen-generation, ferrosilicon process, for aviation purposes)	.....	.....	.....	.....	..	51S25a	.....
Caustic	.....	.....	.....	75-15	S	51S7	.....
Sodium Acetate, anhydrous	.....	.....	.....	4-503-336	C	.....	.....
Bichromate	.....	.....	.....	4-503-345	C	.....	.....
Bisulfite	.....	.....	.....	4-503-350	C	.....	.....
Carbonate, gran., monohydrate crystals	.....	.....	O-S-581	O-S-581	..	.....	.....
Cyanide (insecticide fumigation)	.....	.....	O-S-591	O-S-591	..	.....	.....
Fluoride (insecticide)	.....	.....	O-S-601	O-S-601	..	O-S-601	.....
Hydrosulfite (tech.)	.....	.....	O-S-603	.....	..	.....	.....
Hydroxide (for recoil mechanisms)	.....	.....	.....	4-1006A	O	.....	.....
Hyposulfite	.....	.....	.....	4-503-370	C	.....	.....
				4-2	Q	.....	.....
Metaphosphate	.....	.....	.....	4-1050	A	.....	.....
Nitrate, smokeless pwdr.	.....	.....	.....	.....	..	51S8a	.....
Silicate, powdered	C111-36	.....	.....	4-503-395	C	.....	.....
Silicate (water-glass)	.....	.....	.....	4-1035	O	.....	.....
Sulfite (anhydrous for photography)	.....	.....	O-S-606	O-S-606	..	O-S-606	.....
Strontium Carbonate	.....	.....	.....	50-11-63	O	.....	.....
Nitrate (anhydrous)	.....	.....	.....	50-11-58	O	.....	.....
Oxalate	.....	.....	.....	50-11-62	O	.....	.....
Peroxide	.....	.....	.....	50-11-64	O	.....	.....
Sulfur Dioxide	.....	.....	.....	4-4	Q	.....	.....
Dioxide (for ingredient of primers)	.....	.....	.....	50-11-12	O	.....	.....
Dioxide (in plack pwdr.)	.....	.....	.....	50-11-40A	O	.....	.....
Monochloride (commercial)	.....	.....	.....	4-503-410	C	.....	.....
Titanium Dioxide	D384-36	.....	.....	.....	..	.....	.....
Pigment, dry and paste	.....	.....	.....	.....	..	52T4C	.....
Pigment (barium)	D382-35	.....	.....	.....	..	.....	.....
Pigment (calcium)	D383-35	.....	.....	.....	..	.....	.....
Tetrachloride (commercial)	.....	.....	.....	4-503-425	C	.....	.....
Toluene	D362-36	.....	.....	50-11-38A	O	.....	.....
Triacetin (glyceryl triacetate)	.....	.....	.....	50-11-75	O	.....	.....
Tricresyl Phosphate	D363-36	.....	.....	.....	..	.....	.....
Trinitrotoluene	.....	.....	.....	50-13-5A	O	51T2a	.....
Triphenylphosphate	.....	.....	.....	50-11-25	O	.....	.....
(for aircraft dope)	.....	.....	.....	4-28	A	.....	.....
Trisodium Phosphate (tech.)	.....	.....	O-T-671	O-T-671	..	O-T-671	.....
Turpentine, Spirits of	D13-34	.....	.....	.....	..	.....	31-T-1:36T
(for paint, type I)	.....	.....	LLL-T-791a	LLL-T-791a	..	LLL-T-791a	.....
(for paint, type II)	.....	.....	LLL-T-792	LLL-T-792	..	.....	.....
Steam distilled, dest. distilled	.....	.....	.....	.....	..	.....	31-T-1:36T
Venice	.....	.....	.....	42.2-79	E	.....	.....
Ultramarine Blue, dry, paste-in-japan, paste-in-oil	D262-28	K30-1937	TT-U-451	TT-U-451	..	TT-U-451	31-B-3
Umber, raw and burnt	.....	.....	.....	.....	..	52U1d	31-U-1
Venetian Black	.....	.....	.....	.....	..	27V2a	.....
Wax, Candelilla	.....	.....	.....	4-503-93	C	.....	.....
Carnauba	.....	.....	.....	4-503-115A	O	52W2a	.....
Ceresin (yellow, domestic)	.....	.....	.....	.....	..	52W3a	.....
White Lead; basic carbonate, dry, paste-in-oil and semi-paste	D81-34	K23-1937	TT-W-251a	TT-W-251a	..	TT-W-251a	31-P-53:36T
Lead; basic sulfate, dry and paste-in-oil	D82-24	.....	TT-W-261	TT-W-261	..	TT-W-261	31-L-3
Whiting	.....	.....	.....	3-42A	Q	.....	.....
Xylol	D364-36	.....	.....	.....	..	.....	.....
Zinc Chloride	D199-27	.....	TT-W-576	4-503-435A	C	.....	.....
Dust	.....	.....	.....	4-503-440	C	52Z3C	.....
Oxide; dry and paste-in-oil	D79-24	K22-1937	TT-Z-301	TT-Z-301	..	TT-Z-301	31-Z-1
Oxide; leaded, dry and paste-in-oil	D80-24	.....	TT-Z-321	TT-Z-321	..	.....	.....
Sulfide	D386-36	.....	.....	.....	..	.....	.....
Sulfide Pigment (barium)	D385-36	.....	.....	.....	..	.....	.....
Additions and Revisions							
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Agricultural Chemicals

Fertilizer prepared by heating mixture of peat and urea to a temperature at which the urea is decomposed with formation of nitrogen compounds which are insoluble in water. No. 2,101,807. John W. Corey to Dow Chemical Co., both of Midland, Mich.

Preparation, by saturation process, of ammonium sulfate in coarse, crystalline form. No. 2,102,107. Gerrit Berkhoff, Jr., Kerensheide, Post Lutterade, Netherlands, to De Directie van de Staatsmijnen in Limburg, Heerlen, Netherlands.

Formation a phosphate containing slag adapted for use as a fertilizer. No. 2,102,119. Lewis C. Henkel, Fairfield, Ala.

Production fertilizer; adding to acidic fertilizer materials a liquid containing formamide, dissolved free ammonia, urea, and water. No. 2,102,830. John L. Brill, Newark, Del., to du Pont, Wilmington, Del.

Fertilizer nitrifying liquid containing formamide, ammonia, water, and a water soluble salt. No. 2,102,831. John L. Brill, Newark, Del., to du Pont, Wilmington, Del.

Apparatus

Apparatus for deflocculating and clarifying liquids. No. 2,101,810. Anthony J. Fischer, Jackson Heights, N. Y., to Dorr Co., Inc., New York City.

Apparatus for treating carbon black and the like. No. 2,102,054. Edmund Billings, Weston, and Harold H. Offutt, Winchester, Mass., to Godfrey L. Cabot, Inc., Boston, Mass.

Simultaneous production iron and Portland cement in a blast furnace. No. 2,104,564. Wilhelm Lennings, Oberhausen, and Ernst Karwat, Grosshesselohe, near Munich, Germany, to Union Carbide & Carbon Corp., corp. of New York.

Apparatus for manufacturing cellulose coated and impregnated fibrous tubes. No 2,105,273. John Paul Smith to Visking Corp., both of Chicago, Ill.

Cellulose

Method separating an organic acid ester of cellulose from its reaction mixture. No. 2,102,016. Carl J. Malm and Chas. R. Fordyce, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Production mixed ethers of cellulose. No. 2,102,205. Jos. F. Haskins, Wilmington, and Deane C. Ellsworth, deceased, late of Wilmington, Del., by Jos. F. Haskins, administrator, Wilmington, Del., to du Pont, Wilmington, Del.

Method dehydration nitrocellulose; using monohydric aliphatic alcohol in process. No. 2,102,697. Walter E. Gloor, Kennett Sq., Pa., to Hercules Powder Co., Wilmington, Del.

Dehydration cellulose nitrate, using ethyl alcohol in process. No. 2,102,799. David G. Kennedy and Jos. Keen Rulon, Parlin, N. J., to du Pont, Wilmington, Del.

Method stabilizing nitrocellulose fibers. No. 2,103,592. Mahlon G. Milliken to Hercules Powder Co., both of Wilmington, Del.

Apparatus for stabilizing nitrocellulose. No. 2,103,593. Mahlon G. Milliken to Hercules Powder Co., both of Wilmington, Del.

Precipitation or setting of hydroxy-cellulose ethers from alkaline aqueous solutions. No. 2,103,639. Geo. A. Richter to Brown Co., both of Berlin, N. H.

Production with high yield a nitrocellulose product of low solution viscosity from cellulose fiber in shredded condition. No. 2,103,647. Milton O. Schur to Brown Co., both of Berlin, N. H.

Production of water-soluble alkyl derivatives of cellulose, effecting alkylation by means of an alkyl halide and conducted in presence of caustic alkali and cellulose. No. 2,103,952. Leon Lilienfeld, Vienna, Austria.

Purification crude cellulose ethers; dissolving crude ethers in a non-aqueous solvent, and treating solution with chlorine. No. 2,104,017. Russell R. Bradshaw to Dow Chemical Co., both of Midland, Mich.

Acetylation cellulose in presence of methylene chloride to produce cellulose acetate. No. 2,104,023. Louis Etienne Clement, Meudon, France, to Eastman Kodak Co., Jersey City, N. J.

Treatment cellulose derivatives containing nitro groups to clear and stabilize same and to reduce viscosity. No. 2,104,957. Kurt Thinius to Deutsche Celluloid-Fabrik, both of Eilenburg, Germany.

Nitrocellulose emulsion; water-immiscible solution of nitrocellulose emulsified with water through medium of an emulsifying agent comprising methyl cellulose and a sodium salt of a half-ester sulfate of a higher aliphatic alcohol. No. 2,105,155. Malcolm C. Moore, Newark, Del., to Hercules Powder Co., Wilmington, Del.

Hydrolysis cellulose esters. No. 2,105,252. Carl J. Malm, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Chemical Specialty

Preparation insecticide comprising cyclohexane oxide. No. 2,101,587. Arthur A. Levine and Robt. W. McAllister, Niagara Falls, N. Y., to du Pont, Wilmington, Del.

Manufacture paving material, cold-mixing maltha-containing rock material with asphaltic cement made liquid by addition of solvent, such as naphtha. No. 2,101,614. James W. Fraser, Cleveland, O.

Production lubricating oils from petroleum oil residuums. No. 2,101,643. Ernest F. Engelke, Camden, N. J., to Power Patents Co., Jersey City, N. J.

Insecticide and fungicide containing sulfur nitride as its essential active ingredient. No. 2,101,645. Robt. A. Fulton and Willis Conard Fernelius, Columbus, O., to free use of the Public in the Territory of the U. S.

A solid cuprous cyanide composition which is readily suspended in water to form an agricultural spray liquid. No. 2,101,704. Chas. Dangelmajer, Niagara Falls, N. Y., to du Pont, Wilmington, Del.

Process transferring heat, condensing an azeotropic mixture of sulfur dioxide and another volatile liquid, then evaporating mixture. No. 2,101,993. Jos. Fleischer, Dayton, O., to General Motors Corp., corp of Del.

Composition for prevention offset in printing, consisting of gum arabic, water, denatured alcohol, and gum tragacanth. No. 2,101,999. Reinhard A. Habermaier to De Vilbiss Co., both of Toledo, O.

Formation solidified fuel; dissolving a nitrocellulose in an alcoholic solvent. No. 2,102,005. Grinnell Jones, Cambridge, Mass., and Irving B. Rymph, La Grangeville, N. Y., to S. Sternan & Co., Inc. New York City.

Foundry core and dry binder for preparation of same; core binder consisting of mixture of soybean meal containing a vegetable oil, and a gasoline-insoluble, pine wood resin. No. 2,102,122. Fred H. Lane, Hillsdale, N. Y., to Hercules Powder Co., Wilmington, Del.

Manufacture pulverulent, composite glue. No. 2,102,255. Chas. H. Campbell, Kent, Ohio.

Refractory patching cement consisting of grog, clay, and sodium aluminate. No. 2,102,327. John M. McKinley, East Cleveland, and Willard K. Carter, Columbus, O., to National Aluminate Corp., Chicago, Ill.

Accelerator of vulcanization. No. 2,102,547. Lorin B. Sebrell, Silver Lake, O., to Wingfoot Corp., Wilmington, Del.

Production insecticides and fungicides. No. 2,102,564. Robt. J. Bonstein, Scranton, Pa.

Accelerator in rubber vulcanization; vulcanizing rubber in presence of a salt consisting of a bivalent metal combined with diaryl dithio-carbamic acids. No. 2,102,621. Robert C. Goodwin, Lubbock, Tex., and Arthur W. Sloan, Akron, O., Sloan assignor to B. F. Goodrich Co., New York City.

Water-resistant prolamine base composition, useful in formation films, filaments, etc., having property of preventing composition in dry, solid form from spotting or blushing by action of moisture. No. 2,102,623. Donald W. Hansen, Decatur, Ill., to Prolamine Products, Inc., Dover, Del.

Production metallic drier; preparing basic lead drier salt and reacting on same with an agent providing an organic carbonyl acid radical reactive. No. 2,102,633. Kenneth E. Long, So. Euclid, O., to Harshaw Chemical Co., Elyria, O.

Hydraulic fluid comprising solution of an aliphatic monohydric alcohol, a blown oil and a soap. No. 2,102,638. Douglas V. Moses to du Pont, both of Wilmington, Del.

Leather substitute; coating fabric with a plasticized nitrocellulose composition, removing solvent, imprinting on coated surface a photographically reproduced leather design with an ink consisting of cellulose nitrate, pigment, castor oil, ethyl acetate, ethyl alcohol, and butyl acetate, finally coating with a clear nitrocellulose lacquer. No. 2,102,715. Harry J. Jenemann, Newburgh, N. Y., to du Pont, Wilmington, Del.

Dry preparation for protecting plants, trees, and shrubs against bugs and plant diseases, etc., composed of finely pulverized asphalt pitch. No. 2,102,734. Edw. P. Naus, Minneapolis, Minn.

Hydraulic fluid, comprising an organic solvent diluent and a compound containing the ricinoleyl radical. No. 2,102,825. John C. Woodhouse, Cragmere, and Arthur G. Weber, Wilmington, Del., to du Pont, Wilmington, Del.

Manufacture soap beads or the like, using bath of non-aqueous organic volatile cooling liquid. No. 2,102,849. Vaman R. Kokatnur to Autoxygen, Inc., both of New York City.

Complete and stable asphalt solution. No. 2,102,957. Felix Kaufler and Hilger Peter Schmitz to Dr. Alex. Wacker Gesellschaft fur Electrochemische Industrie, G. m. b. H., all of Munich, Germany.

Manufacture refractory bricks; using mixture of an aluminum silicate mineral with another alumina bearing material. No. 2,102,976. Gilbert E. Seil, Cynwyd, Pa., to E. J. Lavino & Co., Phila., Pa.

Insecticide composed of a monomolecular combination of rotenone and dichloroacetic acid. No. 2,103,195. Howard A. Jones, Washington, D. C., dedicated to free use of People of the U. S.

Tree insecticidal oil spray, comprising paraffinic mineral oil, toxic naphthenic acid, and oil soluble emulsifier. No. 2,103,196. Hugh Knight, Claremont, Calif., to Emulsoids, Inc., San Francisco, Calif.

Lubricating grease made from lubricating oil admixed with a metallic salt of a rosin which has been subjected to treatment with a hydrogenation catalyst. No. 2,103,204. Donald A. Lister, Brunswick Ga., to Hercules Powder Co., Wilmington, Del.

Production calcium sulfate plasters, capable, when gauged with water, of setting with a uniformly colored surface. No. 2,103,216. John Stanley Dunn, Norton-on-Tees, and Victor Lefebure, London, England, to Imperial Chemical Industries, Ltd., corp. of Great Britain.

Production refractories; crushing refractory base-material to desired size, applying to particle-surfaces a water-resistant medium, and while latter is tacky applying a comminuted flux ingredient. No. 2,103,249. Howard P. Eells, Jr., Willoughby, O., to Basic Dolomite, Inc., Cleveland, O.

Preparation parting wax; first, mixing melted rosin and gasoline; second, melting paraffin wax and mixing with gasoline, light cylinder oil, kerosene, and castor oil, then adding to this mixture first preparation. No. 2,103,527. Chas. V. Goodyear, Waterloo, Iowa.

Production lubricating oil from a hydrocarbon oil mixture by extraction with a solvent. No. 2,103,591. David R. Merrill, Long Beach, and Philip Subkow, Los Angeles, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Protecting ear corn from insect attack by covering silk end of corn with substance that has been impregnated with a fumigant. No. 2,103,607. Geo. W. Barber, New Haven, Conn., dedicated to free use of the Public.

Accelerator of vulcanization, carrying out vulcanization in presence of an organic sulfur-containing accelerator and diphenylguanidine neutral maleate. No. 2,103,749. Wm. P. ter Horst, Silver Lake, Ohio, to U. S. Rubber Co., New York City.

Preparation water solution of an animal glue material, carbamide, and aldehydes, for formation novel glue for veneers and cross-ply sheets. No. 2,103,776. Edouard Geistlich, Wolhusen, Switzerland.

Alkaline mercerizing solutions having high wetting action; containing mixture of naphthenic acids and organic compounds with at least 6 carbon atoms. No. 2,103,819. Heinrich Lier to Chemical Works, formerly Sandoz, both of Basel, Switzerland.

Method masking odor of drying paints, varnishes, and the like; and fragrant odor-masked paint. No. 2,103,830. Leroy W. Shuger to Balto. Paint & Color Works, Inc., both of Balto., Md.

Assistants for textile and related industries; high molecular nitrogenous organic compounds containing carboxylic groups. No. 2,103,872. Conrad Schoeller and Paul Koerding, Ludwigshafen-am-Rhine, Germany, to I. G., Frankfort-am-Main, Germany.

Colloidal plant food and stimulant; intimate mixture of finely divided natural colloidal phosphate fertilizer and colloidal compounds. No. 2,103,953. Chas. Northen, Orlando, Fla.

Quaternary ammonium salts of mercaptoarylenethiazoles. No. 2,104,068. Wm. Baird, Blackley, England, to Imperial Chemical Industries, Ltd., corp. of Great Britain.

Aqueous emulsion of waterproofing material; waterproofing material dispersed in an aqueous vehicle containing bentonite-like material as emulsifying agent. No. 2,104,077. Edwin O. Groskopf, Rutherford, N. J., to Patent & Licensing Corp., New York City.

Shingles of asbestos-Portland cement type having coating layer composed of an aqueous dispersion of bitumen. No. 2,104,082. Lester Kirschbraun to Patent & Licensing Corp., both of New York City.

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Quaternary ammonium compound, a light-colored, resin-like substance, having property of improving fastness of dyes to water, perspiration, boiling acids and washing; obtained by reacting with ammonia on a chlorhydrin, and treating mixture with dimethyl-sulfate in an aqueous solution of sodium carbonate. No. 2,104,092. Ferdinand Munz, Frankfort-am-Main, and Karl Keller and Otto Trosken, Frankfort-am-Main-Fechenheim, Germany, to General Aniline Works, Inc., New York City.

Lubricating oil, comprising lubricating oil and a residue derived by vacuum distillation from a deasphalted destructive hydrogenation product of a coaly material. No. 2,104,097. Mathias Pier, Heidelberg, and Willy Hirschberger and Heinz Lemme, Ludwigshafen-am-Rhine, Germany, to I. G., Frankfort-am-Main, Germany.

Bleaching composition made from sodium peroxide and metaboric acid. No. 2,104,120. Harvey N. Gilbert and Ignatius J. Wernert, Niagara Falls, N. Y., to du Pont, Wilmington, Del.

Water paint containing water, pigment, casein, and formamide. No. 2,104,264. Paul La Frone Magill and Chas. Dangelmajer, Niagara Falls, N. Y., to du Pont, Wilmington, Del.

Fibrous materials mercerizing agents, composed of phenol and an organic sulfamide of the formula $R\text{-}SO_2NH\text{-}A$. No. 2,104,290. Karl Brodersen, Dessau in Anhalt, Germany, to I. G., Frankfort-am-Main, Germany.

Mercury compound for control fungus diseases of seeds. No. 2,104,316. Jos. Roy Booer, Addiscombe-Surrey, England, and Gustav Kossel, Hackensack, N. J.

Composition for manufacture artificial stone comprising asbestos fibres, Portland cement, coke ash liquor, and coriander seed. No. 2,104,353. Garabed Paghchoian, Waverley, Mass.

Radiator cleaning composition consisting of kerosene, sodium metasilicate, and sodium bichromate. No. 2,104,385. Waldersee B. Hendrey, Beacon, N. Y., to Texas Co., New York City.

Lubricant comprising a mineral lubricating oil, dibutyl phthalate, and a polyvinyl acetate No. 2,104,408. Peter J. Wiezevich, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Lubricant composed of a mineral oil and alkylated polychlorprene. No. 2,104,409. Peter J. Wiezevich, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Production hot mix, cold laid bituminous pavements. Nos. 2,104,410-11. Chas. M. Baskin, Toronto, Ont., Canada, to Standard Oil Development Co., corp. of Del.

Concrete plastic composition, comprising ground corn stalk, anthracite coal ash, and Portland cement. No. 2,104,477. John Draugelis, Girardville, Pa.

Adhesive to be used in combination with insecticides and fungicides containing alphaeleostearic acid. No. 2,104,491. Robt. S. McKinney, Chevy Chase, Md., dedicated to free use of the People of the U. S.

Non-oily, vitreous enamel composition made of sodium silicate, ethylene glycol, glycerol, and corn starch syrups. No. 2,104,531. Fred. Shurley, Salt Lake City, Utah, to Ceramic Machinery Distributors, Ltd., Windsor, Ont., Canada.

Fingerprinting method, applying to sheet of porous paper or like, an invisible film of iron soap by a finger impression, then applying a tannic acid developing solution to underside of paper where impression is located. No. 2,104,586. Mendel E. Freudenheim to Louis Rubin, both of New York City.

Cork composition which is resistant to temperature and humidity changes; comprising cork granules and a binder comprising a synthetic resin, a glutinous adhesive, a polyhydric alcohol plasticizer which is hygroscopic, and a fatty drying oil in gelled condition. No. 2,104,692. Giles B. Cooke and Scott I. Wilbur to Crown Cork & Seal Co, all of Balto., Md.

Wetting and dispersing agents: quaternary ammonium salt having formula $RXSO_4H$, R being an aliphatic hydrocarbon radical, containing at least 8 carbon atoms, and X the nitrogen atom in a pyridine or quinoline ring structure. No. 2,104,728. Heinrich Bertsch and Hans Stober to Bohme Fettchemie-Gesellschaft m. b. H., both of Chemnitz, Germany.

Insecticidal spray: non-aqueous combination of an oil, a contact insecticide selectively soluble in said oil, and an emulsifying agent soluble in said contact agent, to give an unstable dispersion in water. No. 2,104,757. Walter C. O'Kane, Durham, N. H.

Fire extinguishing liquid, including a highly volatile non-combustible liquid substance, cellulose acetate mixed with latter, and an anti-freeze agent. No. 2,104,775. Jay Lawrence Seat, Fairfield, Conn.

Lubricant comprising lubricating oil having another compound incorporated therein. No. 2,104,796. Melvin A. Dietrich to du Pont, both of Wilmington, Del.

Condenser potting composition for condensers impregnated with a halogenated hydrocarbon, comprising mixture of asphaltic material and a medium for inhibiting diffusion of solid material. No. 2,105,087. Raymond P. Lutz, Oak Park, Ill., to Western Electric Co., New York City.

Wave-stilling oil composition: extract obtained from treating mineral oil with a selective naphthenic solvent and a carboxylic acid, having property of lowering surface tension of water. No. 2,105,278. Johan Leonard van der Minne, Amsterdam, Netherlands, to Shell Development Co., San Francisco, Calif.

Physically and chemically heterogeneous agglutinating material composed of diversely and partially etherized cellulose, presenting in aqueous admixture, small stringy structures of less soluble character distributed in a more soluble homogeneous carrier. No. 2,105,310. Isidor Chesler, New York City, to Eagle Pencil Co., corp. of Del.

For use in construction of insulated electrical conductors and cables, composition of acetone-insoluble polymer of acrylic acid ethyl ester, diamyl phthalate, active gas soot, inert, inorganic filling material, beta naphthol, and sulfur. No. 2,105,363. Paul Nowak, and Hermann Hofmeier, Berlin-Charlottenburg, Germany, to General Electric Co., corp. of New York.

Manufacture liquid potash soaps which normally involve a filtering or other purifying process; using superfatting substance in process. No. 2,105,366. Louis Friedrich Wilhelm Pape and Hans Umbach, Dusseldorf-Benrath, Germany, to Henkel & Cie G. m. b. H., Dusseldorf, Germany.

Manufacture artificial sponges from viscose; adding extra carbon disulfide and pore-forming material solids to unripened viscose. No. 2,105,380. Jos. Speijer, Amsterdam, Netherlands.

Joint soldered with a tin-antimony soldering compound. No. 2,105,405. Frederic L. Chase, Dayton, O., to General Motors Corp., corp. of Del.

Dielectric and insulating composition made from a chlorinated aryl constituent and turpentine oil. No. 2,105,407. Frank M. Clark, Pittsfield, Mass., to General Electric Co., corp. of New York.

Coal Tar Chemicals

Preparation carbazole-alkyl ketones. No. 2,101,559. Anderson W. Ralston and Carl W. Christensen to Armour & Co., all of Chicago, Ill.

Preparation mixed thienyl-alkyl ketones. No. 2,101,560. Anderson W. Ralston to Armour & Co., of Chicago, Ill.

Production solid coke from asphaltums, asphaltic residuums or heavy petroleums. No. 2,101,641. Maurice B. Cooke, Plainfield, N. J., Hermann C. Schutt, No. Tarrytown, N. Y., and John W. Throckmorton, New York City, to Alco Products, Inc., New York City.

Coking retort ovens. Nos. 2,102,608-9. Jos. Becker, Pittsburgh, Pa., to Koppers Co., corp. of Del.

Coke oven. No. 2,103,620. Gwynne Cellan-Jones, Linthorpe, Middlesbrough, England.

Coatings

Hardening proteins; coating fibrous material with composition comprising protein, a protein hardening agent, pigment, and a water soluble fatty acid amide. No. 2,101,574. Chas. Dangelmajer, Niagara Falls, N. Y., to du Pont, Wilmington, Del.

Method electrodepositing zinc; using cyanide plating solution containing an ammonium thiocyanate formaldehyde resin. No. 2,101,580. John A. Henricks, Chicago, Ill., to Udylite Co., Detroit, Mich.

Method electrodepositing zinc; using cyanide plating solution containing a thiourea formaldehyde resin. No. 2,101,581. John A. Henricks, Chicago, Ill., to Udylite Co., Detroit, Mich.

Method coating wood with rubber, using first coating of lacquer, then coating of rubber, subjecting coating to heat and sulfur chloride fumes. No. 2,101,714. Arthur J. Keeney, Cuyahoga Falls, Ohio.

Resinous coating composition of improved alkali resistance: solution in an organic solvent of the homogeneous fused products of gelled fatty oil acids, modified alkyd resin, and rosin ester. No. 2,101,792. Carleton Ellis to Ellis-Foster Co., both of Montclair, N. J.

Production bloom effects on artificial straw containing derivatives of cellulose, by means of a coating. No. 2,101,885. Wm Whitehead, Cumberland, Md., to Celanese Corp. of America, corp. of Del.

Production lacquers of the urea resin type. No. 2,102,114. Carleton Ellis to Ellis-Foster Co., both of Montclair, N. J.

Production highly grease-proof, water and moisture-resistant paper, using coating consisting of a mixed alkyl ether of cellulose. No. 2,102,207. James K. Hunt and George H. Latham to du Pont, all of Wilmington, Del.

Preventing seizure of contacting surfaces of soft alloys, etc., having threaded portions, latter coated with a film of an anti-seizing material composed of stearic acid and a compound, combined with a modifying ingredient comprising a lacquer base. No. 2,102,214. Arthur L. Parker, Cleveland, O.

Preparation varnish of high lustre and good flow containing drying oil and an organic compound having an acetylene linkage. No. 2,102,307. August Chwala, Vienna, Edmund Waldmann, Klosterneuburg, near Vienna, and Aldo Martina, Vienna, Austria.

Treatment hectograph bands, using coating of gelatinous duplicating material and an integral non-adhesive film of a water-soluble compound. No. 2,102,399. Wm. B. Whitmore, Oak Park, Ill., to Ditto, Inc., Chicago, Ill.

Coatings composed of undissolved nitrocellulose and an organic liquid, mixed with carbon black wet with amyl alcohol, then mixed with solvent, diluent, and resin. No. 2,102,595. Maurice V. Hitt, Wilmington, Del., David G. Kennedy and Harry L. Priddy, Parlin, N. J., to du Pont, Wilmington, Del.

Chlorinated rubber coating composition, comprising a homogeneous solution of chlorinated rubber and thermolyzed tung oil. No. 2,103,186. Jacob M. Schantz to Hercules Powder Co., both of Wilmington, Del.

Metallic articles having thereon coating of white clouded vitreous enamel. Nos. 2,103,228-9. Ignaz Kreidl, Vienna, Austria.

Method rendering cellulose film adherent; coating film with lacquer solution of nitrocellulose and linseed oil, drying, then coating with a resinous material. No. 2,104,057. Clyde Scott, Newark, N. J.

Lacquer-undercoat protective coating for bare plaster or like base. No. 2,104,240. Wm. L. Pringle to U. S. Gypsum Co., both of Chicago, Ill.

Preservative and contact coating for light-sensitive devices; transparent coating comprised of a resin, a plasticizer, and a translucent reinforcing material. No. 2,104,483. Geo. W. Hewitt, Wilkinsburg, Pa., to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Method coating wood products with waterproof penetrating liquid containing Chinawood oil, using also final coating comprising wax containing a solvent, a drier, and coloring matter. No. 2,104,637. Kenneth E. Crooks, Williamsport, Pa.

Magnetic core; applying to finely divided magnetic particles an insulating coating of finely divided refractory insulating material, magnesium hydroxide, and an alkali metal silicate, then heat treating coating. No. 2,105,070. Adolph F. Bandur, Berwyn, Ill., to Western Electric Co., Inc., New York City.

Dyes, Stains, etc.

Diazo salt preparations. No. 2,101,664. Max Wyler, Blackley, Manchester, England, to Imperial Chemical Industries, Ltd., corp. of Great Britain.

Production two-color effects on skins or furs, using chromium mordanting bath. No. 2,101,696. Heinrich Wagner, Mannheim, and Max Zabel and Alfred Ensslin, Dessau in Anhalt, Germany, to General Aniline Works, Inc., New York City.

Manufacture monomethyl-para-aminophenol and its sulfate. Nos. 2,101,749-50. Simon Norman, Providence, R. I., to Industrial Dyestuff Co., East Providence, R. I.

Vat dye paste comprising a thioindigoid vat dye and a hydrobenzene compound, to which paste a printing gum is added to make same useful in printing cellulose fibers. No. 2,101,828. Harold W. Wass and Howard J. Rupright to Dow Chemical Co., all of Midland, Mich.

Production monoazo dyestuffs. No. 2,102,115. Richard Fleischhauer, Frankfort-am-Main, Fechenheim, and Erich Fischer, Bad Soden at Taunus, Germany, to General Aniline Works, Inc., New York City.

Production azo dyestuffs. No. 2,102,593. Johann Heinrich Helberger, Cologne-Mulheim, and Otto Bayer, Leverkusen-I. G. Werk, Germany, to General Aniline Works, Inc., New York City.

Production azo compounds and process for dyeing. No. 2,103,269. Jas. G. McNally and Jos. B. Dickey to Eastman Kodak Co., all of Rochester, N. Y.

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For treating burns, dye composition composed of crystal violet, neutral acriflavine, and a material from the group of brilliant green and basic fuchsine. No. 2,103,309. Robt. H. Aldrich, Boston, Mass., and David A. Bryce, Bound Brook, N. J., to Calco Chemical Co., Bound Brook, N. J.

Production azo dyestuffs. No. 2,103,778. Eugen Glietenberg and Friedrich Schubert, Leverkusen-I. G. Werk, Germany, to General Aniline Works, Inc., New York City.

Production azo dyestuffs; in dry state yellow to dark powders, capable of yielding complex metal compounds. No. 2,103,804. Walter Wehrli to Chemical Works formerly Sandoz, both of Basel, Switzerland.

Production triphenylmethane dyestuffs. No. 2,103,846. Hans Grotowsky, Krefeld-Uerdingen, Germany, to General Aniline Works, Inc., New York City.

Preparation phosphorus acid esters of hydroxyalkylamino anthraquinones, being acid wool dyestuffs of the anthraquinone series. No. 2,104,286. Fritz Baumann, Leverkusen-I. G. Werk, Germany, to General Aniline Works, Inc., New York City.

Process obtaining colored discharge effects on vat dyeings capable of being discharged by means of oxidizing agents, the oxidizing effect taking place in an alkaline medium. No. 2,104,300. Robt. Haller, Riehen, and Chas. Graenacher, Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Conversion products of dyestuffs, containing metal in complex union. No. 2,104,357. Fritz Straub and Hans Mayer to Society of Chemical Industry in Basle, both of Basel, Switzerland.

Process applying to cellulose fibers an α-hydroxynaphthalene compound with a free vicinal β-position together with an alkaline reacting and an oxidizing agent, then developing dyestuff by oxidation. No. 2,104,505. Hermann Berthold, Leverkusen-I. G.-Werk, Germany, to General Aniline Works, Inc., New York City.

Manufacture substantive dyestuffs. No. 2,104,595. Erik Schirm, Dessau-in-Anhalt, Germany, to General Aniline Works, Inc., New York City.

Polymethine dyes. No. 2,104,855. Walter Dieterle, Dessau-Ziebigk in Anhalt, and Karl Horst, Hofheim/Taunus, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Production vat dyestuffs of the acylamino-anthraquinone series, containing a thiazolic radical. No. 2,104,891. Werner Zerweck and Wilhelm Kunze, Frankfort-am-Main-Fechenheim, Germany, to General Aniline Works, Inc., New York City.

Adding an amino acid to a solution of a dye composition consisting of a stabilized diazo compound and a coupling component, to form a stabilized clear dye solution. No. 2,105,326. Eugene A. Markush, Jersey City, and Julius Miller, Newark, N. J., to Pharma Chemical Corp., New York City.

Explosives

Method of acceleration of gelatinization of cellulose nitrate and liquid explosive nitric esters. No. 2,102,187. James T. Power, Wilmington, Del., and Kenneth R. Brown, Tamaqua, Pa., to Atlas Powder Co., Wilmington, Del.

Safety ignition mixture ignitable by friction on friction surfaces, consisting of mixture of substances yielding oxygen, semi-pyrophoric metals, abrasive substances, and binding agents. No. 2,103,698. Alfred Schmid, Berlin-Dahlem, Germany.

Production diazodinitrophenol by reacting a salt of picramic acid, a soluble nitrite, and a strong acid in presence of mother liquor derived from manufacture of picramic acid. No. 2,103,926. Harvey B. Alexander, Kingston, N. Y., to Hercules Powder Co., Wilmington, Del.

Detonating explosive composition for blasting caps, consisting of diazodinitrophenol and a heavy metal oxidizing agent. No. 2,104,513. Lloyd H. Fisher, deceased, late of Wilmington, Del., by Anson B. Nixon, administrator, Holly Oak, Del., assignor to Hercules Powder Co., Wilmington, Del.

Nitration organic carbohydrates; solid solution of nitrostarch in nitrated sucrose. No. 2,105,389. Jos. A. Wyler, Allentown, Pa., to Trojan Powder Co., corp. of New York.

Purification sucrose octanitrate, crystallizing same from a solvent. No. 2,105,390. Jos. A. Wyler, Allentown, Pa., to Trojan Powder Co., Allentown, Pa.

Fine Chemicals

Compositions for photographic processing baths; dry mixture of chemicals, comprising sodium thiosulfate, potassium alum, and an anhydrous acid sodium acetate. No. 2,101,834. Fred. R. Bean, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Manufacture water-soluble, storage-stable acetylsalicylic acid products. No. 2,101,867. Clemmy O. Miller and Arthur E. Siehrs, Chicago, Ill.

Preparation photographic gelatin, having minimum region of colloidal properties, such as swelling in water and change in viscosity in alkaline solution at pH 7 and upward. No. 2,101,877. Samuel E. Sheppard and James H. Hudson, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Preparation cellulose acetate propionate butyrate. No. 2,101,994. Chas. R. Fordyce, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Preparation halogen derivatives of n-amyl cresols. No. 2,102,854. Geo. W. Raiziss and LeRoy W. Clemence, Phila., Pa., to Abbott Labs., No. Chicago, Ill.

Organic mercury compound having formula $(RHg)_xR_1$. No. 2,103,657. Carl N. Andersen, Wellesley Hills, Mass., to Lever Bros. Co., corp. of Me.

Sensitizing silver halide emulsions; sensitizing material containing a pentamethinecyanine, the pentamethenyl chain of which is substituted by an alkyl radical. No. 2,104,064. Walter Zeh, Dessau in Anhalt, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Manufacture vanillin. No. 2,104,701. Lloyd T. Sandborn, Wausau, Wis., to Marathon Paper Mills Co., Rothschild, Wis., and Guy C. Howard Co., Rothschild, Wis., jointly.

Prevention yellow stain and regulating halogen ions in light sensitive silver halide emulsions, treating latter with solution containing a soluble iodonium compound. No. 2,105,274. Albert Steigmann, Luxemburg-Ville, Luxemburg, to Felix Sager & Dr. Gossler G.m.b.H., Heidelberg, Germany.

Glass and Ceramics

Laminated safety glass having interposed layer formed from raw cellulose acetate plasticized with mixture of an ester of phthalic acid and carbitol acetate. No. 2,103,883. Geo. B. Watkins and Roy W. Wampler to Libbey-Owens-Ford Glass Co., all of Toledo, O.

Manufacture porous abrasive article. No. 2,104,609. Peter de Leeuw, Niagara Falls, N. Y., to Carborundum Co., both of Niagara Falls, N. Y.

Manufacture porous bodies. No. 2,104,783. Maxwell L. Whitacre and Peter de Leeuw to Carborundum Co., all of Niagara Falls, N. Y.

Industrial Chemicals

Manufacture altered tung oil, which is thicker than the original raw oil, is miscible with glyceride oils, and which dries to a frost-free surface; siccative composition comprising reaction product of a polyphenol with a material containing tung oil. No. 2,101,791. Carleton Ellis to Ellis-Foster Co., both of Montclair, N. J.

Preparation unsaturated organic compounds, reacting a ketone cyanohydrin with a strongly concentrated acid. No. 2,101,821. John Wm. Croom Crawford, Norton-on-Tees, England, to Imperial Chemical Industries, Ltd., corp. of Great Britain.

Manufacture unsaturated amides from ketone cyanohydrins. No. 2,101,822. John Wm. Croom Crawford and James Grigor, Norton-on-Tees, England, to Imperial Chemical Industries, Ltd., corp. of Great Britain.

Preparation cyanhydrins. No. 2,101,823. Harry R. Dittmar to du Pont, both of Wilmington, Del.

Preparation sulfated selachyl alcohol. No. 2,101,831. Alfred Wm. Baldwin and Hugh Mills Bunbury, Blackley, England, to Imperial Chemical Industries, Ltd., corp. of Great Britain.

Manufacture acetic anhydride; condensing in presence of a volatile basic nitrogen compound. No. 2,101,868. Martin Mugdan and Johann Sixt, Munich, German, to Consortium fur Elektrochemische Industrie, G.m.b.H., both of Munich, Germany.

Production para-hydroxy-para'-ethoxy diphenylamine, condensing hydroquinone with paraphenetidine in presence of zinc chloride. No. 2,101,879. Geo. C. Strouse to du Pont, both of Wilmington, Del.

Manufacture alkoxy-anthraquinones in which the alkoxy substituent contains a long-chain alkyl group with 10 to 20 carbon atoms. No. 2,101,910. Frank Lodge and Colin Henry Lumsden, Blackley, Manchester, England, to Imperial Chemical Industries, Ltd., corp. of Great Britain.

Manufacture porous zirconium silicates; mixing natural zircon grains with an aqueous solution of a zirconium and silicon containing salt, and adding an ammonia vapor to set. No. 2,101,947. Chas. J. Kinzie, Niagara Falls, N. Y., to Titanium Alloy Mfg. Co., New York City.

Manufacture alkylene chlorhydrine from gaseous olefine, chlorine and water. No. 2,102,042. Le Roy U. Spence, Cheltenham, Pa., to Rohm & Haas Co., Phila., Pa.

Reduction sulfur dioxide to elemental sulfur by means of carbon. No. 2,102,981. Robert Lepsoe, Trail, B.C., Canada, to Consolidated Mining & Smelting Co. of Canada, Ltd., Montreal, Que., Canada.

Recovery acids from aqueous solution, effecting exchange of the anions of the acids with the anions of a solid onium compound. No. 2,102,103. Oliver M. Urbain and Wm. R. Stemen, Columbus, O., to Chas. H. Lewis, Harpster, O.

Manufacture isatin derivatives. No. 2,102,104. Max Wyler, Blackley, Manchester, England, to Imperial Chemical Industries, Ltd., corp. of Great Britain.

Production ammonia and boric acid, first reacting borax and ammonium sulfate in aqueous soluton. No. 2,102,126. John Merriam Peterson, Avondale, Pa., to Hercules Powder Co., Wilmington, Del.

Process and apparatus for manufacturing ammonium nitrate. No. 2,102,136. James H. Shapleigh to Hercules Powder Co., both of Wilmington, Del.

Production acetic anhydride, heating acetic acid in presence of a phosphorus-containing catalyst. No. 2,102,159. Martin Mugdan and Johann Sixt to Consortium fur Elektrochemische Industrie, G.m.b.H., all of Munich, Germany.

Production formaldehyde from methane, by the action of oxygen. No. 2,102,160. Paul Nashan, Oberhausen, Germany, to Getehoffnungshutte Oberhausen Aktiengesellschaft, Oberhausen-Rheinland, Germany.

Production polymerization products from styrene. No. 2,102,179. Heinrich Hopff, Ludwigshafen-am-Rhine, and Fritz Schmidt, Troisdorf, near Cologne, Germany, to I. G., Frankfort-am-Main, Germany.

Treatment diphenyl sulfide for removal unpleasant odor; subjecting same to action of a halogen. No. 2,102,200. Gregg Dougherty, Princeton, N. J.

Production amino sulfonic acid; reacting urea with sulfur trioxide in presence of sulfuric acid. No. 2,102,350. Paul Baumgarten, Berlin, Germany, to du Pont, Wilmington, Del.

Investment composition comprising a siliceous filler, gypsum, and a titanium compound. No. 2,102,444. Geo. Clyde Van Allen, Maplewood, N. J., to Baker & Co., Inc., corp. of N. J.

Production cyclopropane, bringing 1,3-dichloropropane and zinc together in presence of iodide ions and a compound capable of increasing effective concentration of the iodide ions. No. 2,102,556. Henry F. Hass, West Lafayette, Ind., and Earl W. Gluesenkamp, Dayton, O., to Purdue Research Foundation, West Lafayette, Ind.

Preparation dihalogen butenes. No. 2,102,611. Wallace H. Carothers, Arden, and Arnold M. Collins, Wilmington, Del., to du Pont, Wilmington, Del.

Manufacture zirconium oxide vitreous enamel opacifier. No. 2,102,627. Chas. J. Kinzie, Niagara Falls, N. Y., to Titanium Alloy Mfg. Co., New York City.

Manufacture clouded vitreous enamel, produced from a slip containing clay. No. 2,102,630. Ignaz Kreidl, Vienna, Austria.

Manufacture opaque vitreous enameled and glazed ware. No. 2,102,720. Chas. J. Kinzie, Niagara Falls, N. Y., to Titanium Alloy Mfg. Co., New York City.

Production alcohols. No. 2,102,726. Martin Luther, Mannheim, and Wilhelm Dietrich, Ludwigshafen-am-Rhine, Germany, to I. G., Frankfort-am-Main, Germany.

Production antimony trichloride; reacting metallic antimony with chlorine in a high-boiling aromatic solvent. No. 2,102,737. Ferdinand W. Peck, Penns Grove, N. J., and Wm. R. Waldron, Wilmington, Del., to du Pont, Wilmington, Del.

Production acetaldehyde from acetylene by catalytic hydration in the gas phase by means of a cadmium phosphate catalyst. No. 2,102,751. Arno Scheuermann, Ludwigshafen-am-Rhine, Rudolf Brill, Heidelberg, and Gustav Wietzel, Mannheim, Germany, to I. G., Frankfort-am-Main, Germany.

Manufacture partial oxidation products. No. 2,102,863. Guy W. Talbert, Summit, N. J., and John D. Kerr, Forest Hills, N. Y., to National Aniline & Chemical Co., Inc., New York City.

Manufacture unsaturated aldehydes; reacting an aldehyde bisulfite having a CH_2 group next to the aldehyde radical with an aromatic aldehyde in a liquid medium, in presence of an alkaline condensing agent. No. 2,102,965. Walter Christian Meuly, New Brunswick, N. J., to du Pont, Wilmington, Del.

Manufacture cellulose esters of organic acids. No. 2,103,012. Richard Muller, Mannheim-Neuostheim, Martin Schenck, Mannheim, and Wilhelm Wirbatz, Mannheim-Waldhof, Germany, to C. F. Boehringer & Soehne G.m.b.H., Mannheim-Waldhof, Germany.

Process enhancing stability to water of effects unstable to water produced locally by mechanical means on textiles containing cellulose. No.

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2,103,018. Andreas Ruperti to Society of Chemical Industry in Basle, both of Basel, Switzerland.

Method detecting chemically reactive gases; bringing gas in contact with a colorless adsorbing gel, then impregnating gel after adsorption of the gas with an aqueous solution of an inorganic oxidation agent which changes color upon reduction. No. 2,103,136. Friedrich Karl Gustav Bangert, to Otto Heinrich Drazer, both of Lubeck, Germany.

Hardening, waterproofing artificial gut produced from animal fibrous materials, using formaldehyde containing liquids, and iodine containing substances. No. 2,103,138. Oskar Walter Becker, Heidelberg, and Emil Weiss, to Naturin G.m.b.H., all of Weinheim, Germany.

Production xanthates of resin alcohols. No. 2,103,140. Wm. T. Bishop to Hercules Powder Co., both of Wilmington, Del.

Production casein compound. No. 2,103,153. Henry V. Dunham, Bainbridge, N. Y.

Controlled catalytic oxidation; mixture of manganese oxides capable of completely oxidizing carbon monoxide in presence of hydrogen and oxygen with oxidation of hydrogen. No. 2,103,219. Leslie G. Jenness, Brooklyn, N. Y.

Process completely oxidizing carbon monoxide from gases containing hydrogen and carbon monoxide without oxidizing hydrogen. No. 2,103,220. Leslie G. Jenness, Brooklyn, N. Y.

Oxidizing agent for completely oxidizing carbon monoxide in presence of hydrogen without oxidizing hydrogen. No. 2,103,221. Leslie G. Jenness, Brooklyn, N. Y., to Intermetal Corp., Newark, N. J.

Leather

Production smooth leather, process involving use of slaked lime. No. 2,103,232. Hugo Bohm, Munich, Germany.

In leather treatment, subjecting hides after tanning but before fatliquoring to action of a solution of an alkali-metal polyphosphate. No. 2,105,446. John Arthur Wilson, Milwaukee, Wis., to Monsanto Chemical Co., corp. of Del.

Metals, Alloys, Ores

Method aluminumizing surface of a ferrous metal body, using molten flux bath of the salt type. No. 2,101,553. Ernst Johan Mauritz Mattsson to Frans Nilsson, both of Stockholm, Sweden.

High strength, corrosion-resistant copper alloy, composed of copper, nickel, zinc, and aluminum. No. 2,101,625. Elmer L. Munson, Naugatuck, Conn., to American Brass Co., Waterbury, Conn.

Production hot workable copper alloy, composed of copper, nickel, zinc, and aluminum. No. 2,101,626. Elmer L. Munson, Naugatuck, Conn., to American Brass Co., Waterbury, Conn.

Method recovering minerals from ores, subjecting ore to froth flotation operation in presence of an isoalkenyl xanthate. No. 2,101,647. Herbert P. A. Groll, Oakland, Calif., to Shell Development Co., San Francisco, Calif.

Galvanizing composition comprising an alloy of lead, tin and zinc, and a flux capable of dissolving metal oxide in a dry state admixed with the alloy. No. 2,101,816. Frank D. McBride, Phila., Pa.

Recovery compact metallic magnesium from magnesium in finely divided form. No. 2,101,904. Fritz Hansgirg, Radenthein, Austria, to American Magnesium Metals Corp., Pittsburgh, Pa.

Production refined magnesium and magnesium alloys, using fluid flux containing as purifying agents a mixture of antimony sulfide, chloride of iron, zinc and magnesium chlorides. No. 2,101,919. Georg Schichtel, Radenthein, Austria, to American Magnesium Metals Corp., Pittsburgh, Pa.

Copper base alloy comprising copper, cadmium, nickel, aluminum, zinc, and manganese. No. 2,101,930. Chas. H. Davis, Cheshire, and Elmer L. Munson, Naugatuck, Conn., to American Brass Co., Waterbury, Conn.

Lead refining process. No. 2,101,975. Jesse O. Betterton and Yurii E. Lebedeff, Metuchen, N. J., to American Smelting & Refining Co., New York City.

Manufacture metallic sodium, first dissolving sodium chloride in liquid ammonia and electrolyzing the solution. No. 2,102,151. Ryosaburo Hara and Suyekichi Abe, Sendai, Japan, to Asahi Garasu Kabushiki Kaisha, Tokyo, Japan.

Corrosion resistant alloy composed of carbon, manganese, phosphorus, copper, nickel, molybdenum, and iron. No. 2,102,215. Russell F. Passano to American Rolling Mill Co., both of Middletown, O.

Production copper-nickel-titanium alloys. No. 2,102,238. Norman B. Pilling, Westfield, N. J., and Paul D. Merica, New York City, to International Nickel Co., New York City.

Alloy consisting of chromium, copper, molybdenum, carbon, manganese, silicon, and iron. No. 2,102,283. Byramji D. Saklatwalla, Crafton, Pa.

Froth flotation process for ores; using a sulfuric acid derivative as flotation agent. No. 2,102,370. Marion H. Meriss to du Pont, both of Wilmington, Del.

Production copper-sulfur alloy for use in machining operations. No. 2,102,388. Cyril Stanley Smith, Cheshire, Conn., to American Brass Co., Waterbury, Conn.

Preparation aluminum alloy. No. 2,102,448. Henry L. Whitman, Los Angeles, Calif.

Manufacture rimmed steel ingots, comprising addition of two to three ounces of dehydrated borax per ton of metal to molten steel. No. 2,102,502. Rufus E. Zimmerman, Short Hills, N. J., and Clarence D. King, Brooklyn, N. Y.

Method coating and alloying a ferrous metal. No. 2,102,539. Carl F. Lauenstein and Paul F. Ulmer, Indianapolis, Ind., to Link-Belt Co., Chicago, Ill.

Production high conductivity, phosphorus-deoxidized copper. No. 2,102,742. Frank F. Poland, New Brunswick, N. J., to American Smelting & Refining Co., New York City.

Production extruded zinc alloy, composed of aluminum, copper, magnesium, and zinc. No. 2,102,869. Herbert Winter, Buchschlag in Hessia, Germany, to New Jersey Zinc Co., New York City.

Electrode for arc welding; metallic rod being coated with composition comprising titanium dioxide, silica, and alumina and/or magnesium oxide. No. 2,102,891. Lionel E. Faulkner, Hillside, N. J., to Air Reduction Co., Inc., New York City.

Composition for coloring metal, comprising dilute aqueous solution of mercury bichloride and potassium chlorate, acidified with nitric acid. No. 2,102,925. Cortes Neal Sprankle, Oak Park, and Edw. John Golec, Chicago, Ill., to Sears, Roebuck & Co., Chicago, Ill.

Apparatus for roasting finely divided metal sulfides. No. 2,103,088. Edwin J. Mullen, New Rochelle, N. Y., to General Chemical Co., New York City.

Manufacturing non-corrodible sheet metal article, using metal coating resistant to attack by a rustproofing phosphate base solution. No. 2,103,119. Frank P. Romanoff to Apollo Metal Works, both of Chicago, Ill.

Electrically conductive core for a thermionically active cathode made from a nickel-silicon alloy. No. 2,103,267. Ambrose J. Mandell, Westfield, N. J., Edw. Mandel, administrator of said Ambrose J. Mandell, deceased, assignor to Radio Corp. of America, New York City.

Concentration phosphate-bearing minerals; agitating ore pulp containing phosphate-bearing mineral first with crude quinoline, then with an activating agent composed of an inorganic salt. No. 2,103,283. Francis X. Tartaron and James B. Duke, Mulberry, Fla., to Phosphate Recovery Corp., New York City.

Workable alloy having high resistance to lactic acid in solution of the order of 12% at temperatures of 180°-190° F., made from chromium, nickel, cobalt, and molybdenum. No. 2,103,500. Enrique G. Touceda to Consolidated Car Heating Co., both of Albany, N. Y.

Alloy consisting of iron, carbon, and another metal. No. 2,103,610. Wm. MacCormac Burden, Reginald Genders, and Reginald Harrison, Woolwich, London, England, to Sofal, Ltd., London, England.

Treatment copper alloys to leave a refined copper-tin alloy in marketable condition as a residue. No. 2,103,762. Jesse O. Betterton, Metuchen, N. J., and Chas. N. Waterman, Monterrey, Mexico, to American Smelting & Refining Co., New York City.

Corrosion-resisting alloy made from nickel, chromium, iron, silicon, molybdenum, tungsten, carbon, manganese, and copper. No. 2,103,855. Harry E. LaBour to LaBour Co., Inc., both of Elkhart, Ind.

Thermal reduction of magnesiferous compounds, by means of silicon, to produce magnesium. No. 2,103,976. Robt. Suchy and Hellmuth Seliger, Bitterfeld, Germany, to Magnesium Development Corp., corp. of Del.

Concentration ores by froth flotation; carrying out in presence of reaction product of an oxygen free aromatic amino compound and phosphorus pentasulfid. No. 20,614. Reissue. George H. Wigton, Eureka, Utah.

Recovery lead from slime produced in an electrolytic operation. No. 2,104,076. Frederick P. Frick and Jehu P. Cooper, Anaconda, Mont., to Anaconda Copper Mining Co., New York City.

Method roasting finely divided metal sulfides. No. 2,104,091. Edwin J. Mullen, New Rochelle, N. Y., to General Chemical Co., New York City.

Production non-aging flat silicon steel strip. No. 2,104,169. Chas. A. Scharschu, Brackenridge, Pa., to Allegheny Steel Co., corp. of Penn.

Decorating metal surfaces with coating of fused tin, thereafter electroplating with thin layer of tin to develop spangled coating. No. 2,104,269. Floyd F. Oplinger, Niagara Falls, N. Y., to du Pont, Wilmington, Del.

Solubilization and recovery calcium phosphate, alumina, and potassium values from their insoluble minerals. No. 2,104,295. Guiseppe de Varda, Serravalle, Sesia, Italy.

Method and means for soldering, welding and coating metals. No. 2,104,370. Erik Harry Eugen Johansson, Stockholm, Sweden.

Pretreating iron surfaces; producing rough coating which adapts said metal for enamelling. No. 2,104,427. Alexander Kreidl, Vienna, Austria.

Production lead alloys. No. 2,104,444. Frederic W. Willard, Summit, N. J., to Nassau Smelting & Refining Co., New York City.

Passivating rustless iron and steel without etching surface of metal, subjecting same to action of solution of either nitric or chromic acids and either sodium or potassium dichromate. No. 2,104,667. James N. Ostrofsky to Rustless Iron & Steel Corp., both of Balto., Md.

Weld rod comprising metallic composition of manganese, boron, carbon, silicon, and iron. No. 2,104,693. Anthony G. de Golyer, New York City, to Vulcan Alloy Corp., corp. of Del.

Weld rod, comprising metallic composition of manganese, boron, nickel, carbon, and iron. No. 2,104,694. Anthony G. de Golyer, New York City, to Vulcan Detinning Corp., corp. of Del.

High temperature oxidation resistant alloy containing Cr, Ce, Fe, and nickel. No. 2,104,835. Werner Hessenbruch to Heraeus-Vacuumschmetze Aktiengesellschaft, both of Hanau-am-Main, Germany.

High temperature oxidation resistant alloy containing Ce, Cr, and iron. No. 2,104,836. Werner Hessenbruch, to Heracus Vacuumschmetze Aktiengesellschaft, both of Hanau-am-Main, Germany.

Separation from pig iron of the vanadium contained therein. No. 2,104,890. Nicolaus Wark, Soureth-Heerlen, Netherlands.

Die block for hot forging made of steel alloy consisting of carbon, chromium, molybdenum, copper, and iron. No. 2,104,979. Wm. F. Finkl to A. Finkl & Sons Co., both of Chicago, Ill.

Die block for hot forging made from carbon, chromium, molybdenum, nickel, copper, and iron. No. 2,104,980. Wm. F. Finkl to A. Finkl & Sons Co., both of Chicago, Ill.

Manufacture pure ingot iron, scavenging therefrom by oxidation a large proportion of phosphorus. No. 2,105,020. Marvin J. Udy, Niagara Falls, N. Y., to Monsanto Chemical Co., corp. of Del.

Manufacture nickel carbonyl from nickel matte constituted of sulfides. No. 2,105,037. Chas. Frederick Reed Harrison, Selley Oak, Birmingham, and Albert Edw. Wallis, Clydach, England, to International Nickel Co., Inc., New York City.

Alloy steel tool composed of molybdenum, carbon, chromium, and vanadium. No. 2,105,114. James P. Gill, to Vanadium-Alloys Steel Co., both of Latrobe, Pa.

Heat treating white cast iron which includes an alloying element of the carbide forming group. No. 2,105,220. Carl F. Lauenstein and Clarence J. Brinkworth, Indianapolis, Ind., to Link-Belt Co., Chicago, Ill.

Heat resistant alloy consisting of aluminum, chromium, thorium, and iron. No. 2,105,283. Willi Godecke, Witten-Ruhr, and Wm. Guertler, Berlin-Dahlem, Germany, to Degea Aktiengesellschaft (Auergesellschaft), Berlin, Germany.

Temperature control in a flotation process. No. 2,105,294. Arthur J. Weinig, Golden, Colo., to Potash Co. of America, Denver, Colo.

Recovery potassium chloride from halite-sylvite ores by selective flotation. No. 2,105,295. Arthur J. Weinig, Golden, Colo., to Potash Co. of America, Denver, Colo.

Paladium-nickel-ruthenium alloy. No. 2,105,312. Sidney Cohn to Sigmund Cohn, both of New York City.

Refining magnesium. No. 2,105,342. Adolf Beck, Bitterfeld, Germany, to Magnesium Development Corp., corp. of Del.

Manufacture pure zinc oxide by precipitation from a solution. No. 2,105,394. Riccardo Allavena to Societa Italiana Pirelli, both of Milan, Italy.

Cleaning metal surfaces by immersion in a continuous body of molten ferrous alloy until oxide scale is removed. No. 2,105,439. Clarence H. Lorig to Battelle Memorial Institute, both of Columbus, O.

Treatment lateritic ores; first leaching crushed ore with a cold, dilute solution of hydrochloric acid. No. 2,105,456. Wm. Geo. Hubler and Frederick Ratcliffe Archibald, Duparquet, Que., Canada, to Ventures, Ltd., Toronto, Ont., Canada.

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Naval Stores

Refining rosin ester by removal color bodies with substance selected from group of furfural and furfuryl alcohol. No. 2,103,445. Jos. N. Borglin to Hercules Powder Co., both of Wilmington, Del.

Paper and Pulp

Method bleaching pulp, using chlorine and hydrated lime in process. No. 2,101,706. John Alden Extrom, Tomahawk, Wis., and Hoke Martin, Chicago, Ill., Extrom assignor to Tomahawk Paper Co., Tomahawk, Wis., and Martin assignor to Mathieson Alkali Works, Inc., New York City.

Paper making machine. No. 20,606. Reissue. Chas. R. Seaborne, Appleton, Wis., to American Lakes Paper Co., Waukegan, Ill.

Apparatus for manufacture saturated, sized, filled, or coated paper or fiberboard. No. 2,104,052. Izador J. Novak to Raybestos-Manhattan, Inc., both of Bridgeport, Conn.

Manufacture sized paper of high folding, Mullen, and tearing strengths, and being non-picking when printed; having cold swelling starch uniformly distributed throughout paper. No. 2,105,052. Johann Oltmans, Groningen, Netherlands.

Manufacture metal coated paper. No. 2,105,440. Bert C. Miller, Montclair, N. J., to Bert C. Miller, Inc., New York City.

Petroleum Chemicals

Removal wax from hydrocarbon oil. No. 2,100,916. Ernest F. Pevere and Clifford G. Ludeman, Beacon, N. Y., to Texas Co., New York City.

Conversion hydrocarbon oils. No. 2,100,922. Albert P. Sachs to Petroleum Conversion Corp., both of New York City.

Method cleaning filter leaves used in the filtration of petroleum tars; first subjecting leaves to action of a hot petroleum hydrocarbon tar solvent, then to a hot concentrated water solution of a caustic alkali. No. 2,101,012. Hoyt A. Pond and Elvis E. Perry, Port Arthur, Tex., to Texas Co., New York City.

Treatment hydrocarbon oils. No. 2,101,088. Chas. W. Nofsinger, Orange, and Percy C. Keith, Jr., Short Hills, N. J., to Gasoline Products Co., Inc., Newark, N. J.

Production mercaptans having a lesser number of carbon atoms to the molecule than the olefine hydrocarbons from which they are produced. No. 2,101,096. Raymond Reuter, Upper Aetna Lake, Medford Lakes, N. J., and Frank L. Gaus, Phila., Pa., to Atlantic Refining Co., Phila., Pa.

Catalyst for hydrogenating hydrocarbons. No. 2,101,104. Harold M. Smith and Harry T. Rall, both of Bartlesville, Okla.

Production lubricating oil from oil containing asphalt by treatment with petroleum naphtha. No. 2,101,308. Ulric B. Bray, Palos Verdes Estates, and Claude E. Swift, Glendale, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Production unsaturated hydrocarbons. No. 2,101,314. Adolf Grun, Basel, Switzerland, to American Hyalsol Corp., Wilmington, Del.

Process and apparatus for conversion of hydrocarbon liquids and gases. No. 2,101,485. Malcolm P. Youker to Phillips Petroleum Co., both of Bartlesville, Okla.

Method and apparatus for cementing wells. No. 2,101,640. Wm. Cantwell Chonette Ojai and Robt. H. Hamilton, Los Angeles, Calif., to Shell Development Co., San Francisco, Calif.

Manufacture unsaturated xanthates, providing mixture of mono-olefinic aliphatic monohydric alcohol, containing at least four carbon atoms to the molecule. No. 2,101,648. Herbert Peter Augustus Groll, Berkeley, Calif., to Shell Development Co., San Francisco, Calif.

Preparation xanthates of unsaturated secondary alcohols. No. 2,101,649. Herbert P. A. Groll, Berkeley, Calif., to Shell Development Co., San Francisco, Calif.

Method cracking hydrocarbon oils. No. 2,101,800. Hermann C. Schutt, No. Tarrytown, N. Y., to Gyro Process Co., Detroit, Mich.

Manufacture motor fuel from hydrocarbon mixture containing butenes and propylene. No. 2,101,857. Vladimir Ipatieff and Raymond E. Schaad to Universal Oil Products Co., all of Chicago, Ill.

Separation emulsions of the oil-in-water type. No. 2,102,051. Wm. Woelflin, Long Beach, Calif., to Petroleum Rectifying Co. of Calif., Los Angeles, Calif.

Production liquid hydrocarbons from hydrocarbon mixture containing butenes and propylene. No. 2,102,073. Vladimir Ipatieff and Raymond E. Schaad to Universal Oil Products Co., all of Chicago, Ill.

Production liquid hydrocarbons from normally gaseous olefin mixtures. No. 2,102,074. Vladimir Ipatieff and Raymond E. Schaad to Universal Oil Products Co., all of Chicago, Ill.

Process cracking high boiling hydrocarbon oils to form low boiling hydrocarbon oils. No. 2,102,234. David G. Brandt, Westfield, N. J., to Power Patents Co., Jersey City, N. J.

Hydrocarbon oil cracking process. No. 2,102,269. Lyman C. Huff to Universal Oil Products Co., both of Chicago, Ill.

Method dewaxing hydrocarbon oils. No. 2,102,334. Earl Petty, Hempstead, N. Y., to Sun Oil Co., Phila., Pa.

Process reactivation spent clay, extracting same with a neutral organic solvent in presence of ammonia. No. 2,102,341. George Hugo von Fuchs, Wood River, Ill., to Shell Development Co., San Francisco, Calif.

Apparatus for treating hydrocarbon oils. No. 2,102,548. Chas. W. Stratford, to Stratford Development Corp., both of Kansas City, Mo.

Manufacture motor fuel. No. 20,596. Reissue. Jack Francis Mahon Taylor and Bernard Sutro Greensfelder, San Francisco, and Russell Norman Shiras, Long Beach, Calif., one-half to Shell Development Co., San Francisco, Calif., and one-half to Phillips Petroleum Co., Bartlesville, Okla.

Production decomposition products from olefine-SO_3 complexes. No. 2,102,654. Robt. Dewey Snow to Phillips Petroleum Co., both of Bartlesville, Okla.

Treatment "sour" petroleum distillates without use of aqueous alkaline solutions. No. 2,102,796. John Happel, Brooklyn, and Donald W. Robertson, Queens Village, N. Y., to Socony-Vacuum Oil Co., New York City.

Dewaxing hydrocarbon oils. No. 2,102,828. Paul D. Barton, Scarsdale, N. Y., and Daniel B. Banks, Upper Darby, Pa., to Sun Oil Co., Phila., Pa.

Removal copper compounds from copper-sweetened hydrocarbon oils; by treating latter with a solid sulfide of a heavy metal above hydrogen in the electro-chemical series. No. 2,102,878. Wayne L. Benedict to Universal Oil Products Co., both of Chicago, Ill.

Hydrocarbon oil cracking process. No. 2,102,889. Carbon P. Dubbs to Universal Oil Products Co., both of Chicago, Ill.

Process stabilizing cracked gasoline distillate to separate gaseous olefins from the gasoline. No. 2,102,927. Hans Tropsch to Universal Oil Products Co., both of Chicago, Ill.

Conversion paraffinic normally gaseous hydrocarbons into polymers. No. 2,102,947. Gerald L. Eaton, Phila., Pa., to Polymerization Process Corp., Jersey City, N. J.

Manufacture fixed gas from petroleum oil. No. 2,103,182. Herbert E. Rider, New York City, to Henry L. Rosenfeld, Jr.

Recovery hydrocarbon vapors. No. 20,587. Reissue. Paul M. Raigorodsky to Petroleum Engineering, Inc., both of Tulsa, Okla.

Purification crude waxy hydrocarbons. No. 2,103,504. Jas. M. Whiteley, Roselle, and Hans G. Vesterdal, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Production polymers of ketenes and their esters; reacting aliphatic polyhydroxy alcohols with products obtained by polymerization of ketene in presence of an acid esterification catalyst. No. 2,103,505. Peter J. Wiezevich and Anthony H. Gleason, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Production gasoline from heavy hydrocarbon oil. No. 2,103,561. Harris A. Smith, Port Arthur, Tex., to Texas Co., New York City.

Treatment cracked petroleum distillates. No. 20,605. Reissue. Rudolph C. Osterstrom, Kenilworth, and Cary R. Wagner, Chicago, Ill., to Pure Oil Co., Chicago, Ill.

Method and apparatus for testing hydrocarbon gases. No. 2,103,582. Lon S. Gregory to Refinery Supply Co., both of Tulsa, Okla.

Method and apparatus for heating oil. No. 2,103,719. Audley E. Harnsberger, Winnetka, Ill., to Pure Oil Co., Chicago, Ill.

Distillation hydrocarbon oils. No. 2,103,898. Fred G. Fellows to Continental Oil Co., both of Ponca City, Okla.

Non-gumming motor fuel; gasoline having its gum-solventicity raised with a mineral oil and a halogenated aromatic compound. No. 2,103,927. Lester S. Bale, Shaker Heights, O., to Standard Oil Co. (Ohio), Cleveland, O.

Treatment hydrocarbon oils. No. 2,103,977. Geo. Armistead, Jr., Scarsdale, N. Y., to Gasoline Products Co., Inc., Newark, N. J.

Liquid motor fuel for internal combustion engines, composed of a non-benzenoid petroleum distillate, a low molecular weight alcohol, and a saturated aliphatic ether. No. 2,104,021. Conral Cleo Callis, Oakmont, Pa.

Treatment cracked hydrocarbon distillates. No. 2,104,049. Jacque C. Morrell to Universal Oil Products Co., both of Chicago, Ill.

Process combining hydrocarbon gases with hydrocarbon liquids. No. 2,104,285. Malcolm P. Youker to Phillips Petroleum Co., both of Bartlesville, Okla.

Conversion hydrocarbons. No. 2,104,296. Frederick E. Frey to Phillips Petroleum Co., both of Bartlesville, Okla.

Method fractional distillation. No. 2,104,310. Petrus Jurjen Roelfsema, Walnut Creek, Calif., to Shell Development Co., San Francisco, Calif.

Process creating high temperatures; first atomizing emulsion of water and hydrocarbon oil and introducing same into a retort. No. 2,104,311. Robt. H. Russell, Cleveland, O., to Gas Fuel Corp., corp. of Del.

Recovery earth components from wells. Nos. 2,104,327-8. Meinhard H. Kotzebue, Tulsa, Okla.

Solvent refining of mineral oil. No. 2,104,379. Daniel Stryker, White Plains, and James H. Grahame, Mt. Vernon, N. Y., to Texas Co., New York City.

Treatment mineral lubricating oil with a solvent which is immiscible with and has a lower boiling point than water. No. 2,104,401. Eger V. Murphree and Edw. D. Reeves, Baton Rouge, La., to Standard Oil Development Co., corp. of Del.

Production alkylated hydroxy derivatives of aromatic hydrocarbons. No. 2,104,412. Hyym E. Buc, Roselle, N. J., to Standard Oil Development Co., corp. of Del.

Conversion process for hydrocarbon oils. No. 2,104,418. Gustav Egloff to Universal Oil Products Co., both of Chicago, Ill.

Reacting naphthene hydrocarbon with an aromatic hydrocarbon, capable of being alkylated in presence of aluminum chloride and hydrogen chloride and in absence of added olefins, to form a hydrocarbon derivative of the aromatic. No. 2,104,424. Vladimir Ipatieff and Aristid V. Grosse to Universal Oil Products Co., all of Chicago, Ill.

Treatment wells. No. 2,104,488. Harvey T. Kennedy, Forest Hills, and Blaine R. Wescott, Oakmont, Pa., to Gulf Research & Development Co., corp. of Del.

Dewaxing hydrocarbon lubricating oil by centrifuging. No. 2,104,567. Robt. E. Manley, Port Arthur, Tex., to Texas Co., New York City.

Production high melting point wax from petrolatum stock. No. 20,623. Reissue. Claude F. Tears, Warren, Pa., to Petroleum Processes Corp., Wichita, Kans.

Refining hydrocarbon oil vapor by contact with heavy maintained solution of a heavy metal salt. No. 2,104,791. Wallace A. Craig to Vapor Treating Processes, Inc., both of Los Angeles, Calif.

Process for breaking petroleum emulsions of the water-in-oil type. Nos. 2,104,793-4-5. Melvin De Groote, St. Louis, Mo., to Tret-O-Lite Co., Webster Groves, Mo.

Stabilized fuel oil. No. 2,104,919. Gary Myron Whitney, Compton, Calif., to Shell Development Co., San Francisco, Calif.

Purification hydrocarbons. No. 2,104,956. Georg Stern, Neckargemund and Werner Hoess, Ludwigshafen-am-Rhine, Germany, to I. G., Frankfort-am-Main, Germany.

Cracking and coking petroleum oils. No. 2,105,122. Thos. B. Kimball, Hammond, Ind., and Orin G. Kaasa, Munster, Ind., to Sinclair Refining Co., New York City.

Hydrocarbon oil conversion process. No. 2,105,191. Thos. Kenney, Robinson, Ill., one-fourth to Sylvia S. Lee, Kenilworth, Ill., and one-fourth to Ira J. Wilson, Winnetka, Ill.

Pigments, Dry Colors and Fillers

Lustrous pigment prepared by precipitation of lead phosphate. No. 2,103,007. Heinz Hunsdiecker, Cologne-Lindenthal, Germany.

Resins, Plastics, etc.

Manufacture hydrocarbon resins by polymerization of a cracked hydrocarbon distillate rich in unsaturates including diolefines, by means of a metallic halide polymerization catalyst. No. 2,101,558. Thos. F. Nealon, Boston, Mass., to Monsanto Chemical Co., St. Louis, Mo.

Resin dehydration. No. 2,101,635. Howard L. Bender, Bloomfield, N. J., to Bakelite Corp., New York City.

Preparation a moldable composition from a phenol-aldehyde resin that is hardenable in a mold under action of heat and pressure without detectable free ammonia in molded article when hexamethylenetetramine is included as hardening agent. No. 2,101,642. Ernst Elbel and Fritz Seebach, Erkner, near Berlin, Germany, to Bakelite Corp., New York City.

Preparation methyl ester of methacrylic acid; dehydrogenating isobutyraldehyde, finally oxidizing product and esterifying oxidation product with methanol. No. 2,101,820. John C. Woodhouse to du Pont, both of Wilmington, Del.

Manufacture oil soluble resinous product; reacting, under influence of ammonia as a catalyst, an aldehyde with an ether. No. 2,101,853. Mortimer T. Harvey, East Orange, N. J., to Harvel Corp., corp. of New Jersey.

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Production solid, heat-hardenable soluble resinous condensation products; condensing by aid of an alkaline catalyst, an excess of formaldehyde over the equimolecular proportion with a phenol. No. 2,101,944. Herbert Honel, Vienna, Austria, to Helmuth Reichhold, Detroit, Mich., doing business as Reichhold Chemicals.

Production synthetic resin which will remain in solution with cellulose acetate for production of a stable and transparent film, and is practically water-white; using phthalic anhydride, glycerin, and lactic acid in process. No. 2,101,948. Felix Lauter, Evanston, Ill., to Sealkote Corp., Chicago, Ill.

Treatment cellulose esters to render suitable for molding. No. 2,101,984. Frederick R. Conklin and Chas. L. Fletcher, Kingsport, Tenn., to Eastman Kodak Co., Jersey City, N. J.

Production oil-soluble phenolic resin. No. 2,102,130. John B. Rust, Orange, N. J., to Ellis-Foster Co., Montclair, N. J.

Production synthetic resin, using phenol, formaldehyde and oxalic acid in process. No. 2,102,617. John D. Farber to Management & Research, Inc., both of Phila., Pa.

Manufacture thermoplastic molding compositions, containing rubber. No. 2,102,838. Edw. R. Dillehay, Glen Ellyn, Ill., to Richardson Co., Lockland, O.

Synthetic resin of low acid number, obtained by heating to resinification mixture of phthalic anhydride and glycerol in presence of a copper compound in solution. No. 2,103,238. Herbert O. Albrecht, Ronald A. McGlone, and Stephen John Roskosky, Flint, Mich., to du Pont, Wilmington, Del.

Homogeneous, fusible, oil-soluble resins, made by reacting glycerol, maleic acid, monobasic aliphatic acid of one to five carbon atoms, and an acid obtained by hydrolysis from a fatty oil or fat. No. 2,103,273. Israel Rosenblum, Jackson Heights, N. Y.

Production vinyl resin, resulting from polymerization of a vinyl compound and containing a basic organic inhibitor of discoloration of the resin on heating in presence of iron, iron compounds or ferrous surfaces. No. 2,103,581. Daniel M. Gray to Hazel-Atlas Glass Co., both of Wheeling, W. Va.

Acid-proof self-hardening compositions containing a liquid phenol-aldehyde resin capable of being hardened, and a neutral ester of a mineral acid and an aromatic-aliphatic alcohol. No. 2,103,768. Karl Dietz, Frankfort-am-Main, and Karl Frank, Bad Soden in Taunus, Germany, to Pen-Chlor, Inc., Phila., Pa.

Treatment casein plastics having predetermined color; first polishing articles, subjecting same to action of a hypochlorite solution whereby color is injured and surface rendered slimy, then subjecting same to action of a solution having a weak acidic reaction, to restore color. No. 2,103,993. Will E. Vawter, Bainbridge, N. Y., to American Plastics Corp., New York City.

Laminated sheet, fibrous product having hard resin of the coumarone-indene type in an aqueous solution dispersed throughout. No. 2,104,081. John A. Kenney, Plainfield, N. J., to Barrett Co., New York City.

Film formed from solution of polymeric acrylic acid methyl ester and polymeric vinyl acetate in admixture with phthalic acid amyl ester and phthalic acid methyl glycol ester. No. 2,104,168. Otto Rohm and Walter Bauer, Darmstadt, Germany, to Rohm & Haas Co., Phila., Pa.

Manufacture and use synthetic resins; treating liquids to effect removal of particular constituents by adsorption, subjecting liquid to action of a synthetic resin. No. 2,104,501. Basil Albert Adams and Eric Leighton Holmes, Teddington, England.

Polymerizing methyl methacrylate to obtain plastic materials; carrying out polymerization reaction in presence of a polymerization catalyst and a polymerization inhibitor. No. 2,104,760. Archibald Renfrew, Norton-on-Tees, England, to Imperial Chemical Industries, Ltd., corp. of Great Britain.

Method pretinting a resin comprising in its individual polymers a reactive cyclopentadiene structure; reacting an aldehyde or ketone compound with resin in presence of an alkaline catalyst to produce development of fulvene color. No. 2,104,829. Wm. H. Carmody, Pittsburgh, Pa.

Doughy, putty-like plastic composition, said to be non-shrinking, containing a cellulose derivative, a volatile liquid which is a solvent for cellulose derivative, a liquid which is a non-solvent for same, and a finely divided cellulose filler. No. 2,105,111. Gustavus J. Esselen, Swampscott, Mass., to A. S. Boyle Co., Cincinnati, O.

Vinyl resin prepared from a polyvinyl alcohol and an aliphatic aldehyde having incorporated therein an anti-oxidant of the polyhydroxybenzol type to suppress yellowing at a temperature of 100° C. No. 2,105,208. Maurice Belloc to Societe Nobel Francaise, both of Paris, France.

Porous fabric impregnated with binder comprising soluble blood and a synthetic resin, to produce a tough, flexible, highly waterproof laminated product. No. 2,105,268. Adrian A. Robinson, Chicago, Ill., to Wilson & Co., Inc., corp. of Del.

Molding powder consisting of wood flour, soluble animal blood, a water dispersible phenol formaldehyde resin. No. 2,105,269. Adrian A. Robinson, Chicago, Ill., to Wilson & Co., Inc., corp. of Del.

Resinous thermoplastic materials, composed of polymerized ethyl ester of acrylic acid and polyvinyl acetate, carbon, talcum, and beeswax. No. 2,105,364. Paul Nowak, Charlottenburg, Germany, to General Electric Co., corp. of New York.

Rubber

Improved rubber composition, first preparing aqueous dispersion of uncoagulated vulcanized rubber latex and a solution of dissolved unvulcanized, deresinated balata to form a homogeneous mixture of tough resilient material. No. 2,101,915. Robert R. Olin, Akron, O., to Worthington Ball Co., Elyria, O.

Method surface-conditioning a rubber article, using solution containing nitric acid. No. 2,102,456. Abraham K. Brill and Walter A. Wake to Republic Rubber Co., all of Youngstown, O.

Treatment vulcanized rubber. No. 2,102,741. Francis Norman Pickett, London, England, to U. S. Rubber Products, Inc., New York City.

Method retarding deterioration of an organic substance which tends to deteriorate by absorption of oxygen from the air. No. 2,103,188. Waldo L. Semon, Silver Lake, and Robt. V. Yohe, Cuyahoga Falls, O., to B. F. Goodrich Co., New York City.

Manufacture vulcanized rubber, introducing into composition finely divided silica intimately associated with an alkali taken from the soda and potash group. No. 2,103,461. Alfred Louis Hock, Alfred Kirkham, and Howard Spence, Manchester, England, to Peter Spence & Sons, Ltd., all of Manchester, England.

Composition for preserving rubber. No. 2,103,686. Geo. D. Martin, Nitro, W. Va., to Monsanto Chemical Co., Wilmington, Del.

Treatment chlorinated rubber solutions to reduce their viscosity; subjecting same to violent mechanical treatment producing shearing stresses within solution. No. 2,104,069. John Philip Baxter, Widnes, Terence Neil Montgomery, Lancaster, and Jos. Grange Moore, Runcorn, England, to Imperial Chemical Industries, Ltd., corp. of Great Britain.

Production rubber solutions and similar substances; causing crude rubber or similar substance to react in presence of a solvent with an acid agent, carrying out reaction with a sulfinic acid. No. 2,104,358. Jules Treboux to J. R. Geigy A. G., both of Basel, Switzerland.

Reacting compounds of polymerized acrylic acid or its esters with sulfur or selenium for production artificial rubber resistant to action of mineral oils and the like. No. 2,105,361. Paul Nowak, Berlin-Charlottenburg, Germany, to General Electric Co., Schenectady, N. Y.

Textile, Rayon

Machine for manufacture artificial silk. No. 2,101,720. Leon H. Ryan to Delaware Rayon Co., both of New Castle, Del.

Spinning solution for manufacture filaments or films by extrusion processes, containing oil, cellulose acetate, soap, an organic solvent, and a volatile non-solvent. No. 2,101,886. Wm. Whitehead, Cumberland, Md., to Celanese Corp. of America, corp. of Del.

Production effects on filaments, etc., made from water-insoluble organic acid ester of cellulose or cellulose ether. No. 2,101,887. John Allan and James Arthur Wainwright, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Production artificial textiles by dry spinning process. No. 2,102,647. Robt. Pierce Roberts, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Production materials, containing organic esters of cellulose, particularly adapted for production of color and other effects. No. 2,102,648. Robt. Pierce Roberts, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Formation textiles from cellulose acetate; adding to spinning solution from which filaments are formed, a dye-base containing a diazotizable amino group and a developer. No. 2,102,789. Camille Dreyfus, New York City, and Wm. Whitehead, Cumberland, Md., to Celanese Corp. of America, corp. of Del.

Spinning liquor for artificial silks. No. 2,102,933. Samuro Yamamoto to Shozaburo, Hashino, both of Iriarai Machi, Ebara-gun, Tokyo-fu, Japan.

Rendering fibers or threads from animal collagen ironproof; tanning same with chromium compounds. No. 2,103,163. Gustav Lange to Carl Freudenberg G. m. b. H., both of Weinheim, Germany.

Manufacture chintz, by impregnating cloth with a water solution of urea formaldehyde and a coagulatable protein, finally passing cloth through heated glazer to set resin and glaze cloth. No. 2,103,293. Arnold Leroy Lippert to Jos. Bancroft & Sons Co., both of Wilmington, Del.

Mechanical shrinking of fabrics; treating same with aqueous solution of oil soluble mineral oil sulfonates and stable mineral oil. No. 2,103,205. Latimer D. Myers to Emery Industries, Inc., both of Cincinnati, O.

Rayon yarn for reinforcement in rubberized products, *e.g.*, heavy duty tires, etc., of from 1,000 to 4,000 denier or more. No. 2,103,245. Edw. G. Budd to Edw. G. Budd Mfg. Co., both of Phila., Pa.

Treatment cellulose acetate textiles for removal glaze marks, subjecting materials to action of a hot aqueous bath comprising paratoluene sulfonamide. No. 2,103,452. Geo. Holland Ellis and Ernest Wm. Kirk, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Improving properties of filaments or yarns containing cellulose organic derivatives, by application finish containing a fatty material taken from the group of higher fatty acids and their glycerides, and an alkyl ester of a para hydroxy benzoic acid. No. 2,103,497. Geo. Schneider, Montclair, N. J., to Celanese Corp. of America, corp. of Del.

Production pattern effects on textiles composed of natural or regenerated cellulose, applying unreacted components of a synthetic resin of the amido-formaldehyde group, and treating with a reagent which inhibits formation of resin. No. 2,103,587. Louis Amedee Lantz, Alex. Lang Morrison, and Wm. Stuart Miller to Calico Printers' Assn., Ltd., all of Manchester, England.

Improved process for manufacture artificial silk from cellulose; using a reagent together with a higher aliphatic alcohol having more than five carbon atoms in the molecule. No. 2,104,722. Heinrich Bertsch, Chemnitz, Germany, to American Hyalsol Corp., Wilmington, Del.

Sheer fabric made from cellulose fibrous material, fibers of which are held together and coated by sheathings of cellulose regenerated from cellulose xanthate. No. 2,104,748. Harold I. Huey, Saylesville, and Wm. W. Russell, East Providence, R. I., to Sayles Finishing Plants, Inc., Saylesville, R. I.

Formation spun yarn, incorporating a weighting metal compound in short lengths or staple fibers containing organic derivatives of cellulose, whereby carding and drawing properties are greatly enhanced. No. 2,104,798. Camille Dreyfus, New York City.

Conversion continuous filaments directly into a product containing staple fibers. No. 2,104,827. Harry Taylor and Wm. Ivan Taylor, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Manufacture spun goods, fabrics, and other textiles, using fibers obtained from animal skins, after use of suitable swelling and tanning agents. No. 2,105,036. Richard Freudenberg and Gustave Lange to Carl Freudenberg G. m. b. H., all of Weinheim, Germany.

Water, Sewage Treatment

Method of and apparatus for treating water. No. 2,101,908. Chas. E. Joos, Phila., Pa., and Geo. H. Gibson, Upper Montclair, N. J., to Cochrane Corp., Phila., Pa.

Apparatus for water treatment. No. 2,101,961. Kemper Slidell, Madison, Wis., to C. F. Burgess Labs., Inc., Chicago, Ill.

Improved water softening compound consisting of trisodium phosphate, sodium aluminate, borax, and an alum. No. 2,102,219. Sidney A. Raymond, Green Bay, Wis.

Automatic apparatus for determining hardness of water. No. 2,102,282. Cecile Marguerite Roy, Meudon, France, to Societe des Usines Chimiques Rhone-Poulenc, Paris, France.

Treatment sewage sludge. No. 2,102,427. Richard L. Lloyd, Great Neck, N. Y., and Henry J. Stehli, Cedar Grove, N. J., Stella Warde Lloyd, executrix of said Richard L. Lloyd, deceased.

Protection steam boilers against caustic embrittlement; maintaining and heating therein, while boiler is still new, water containing a sodium salt of an acid from the group of sulfuric and phosphoric. No. 2,104,528. Homer H. Richardson, Western Springs, Ill., to National Aluminate Corp., Chicago, Ill.

Water softener and apparatus. No. 2,104,986. Helmer M. Haagenson, Excelsior, Minn.

Purification water; treating water with a heavy metal salt and a high valent anion having property of increasing cataphoretic velocity of the suspensoids, then separately adding an alkaline buffer, finally passing through a filter charged with an alkaline earth zeolite. No. 2,105,277. Oliver M. Urbain, Columbus, O., to Chas. H. Lewis, Harpster, O.